PC CONFIGURE™

PROGRAMMING SOFTWARE

EFJohnson ®

PCCONFIGURE™

PROGRAMMING SOFTWARE

USER MANUAL

This manual covers PCConfigure™ Versions through 1.22.0

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1.1 PROGRAMMING SETUP

To program the various transceivers, a Windows®-based computer, EFJohnson PCConfigure™ programming software, Part No. 023-9998-488, and the following items are required to program the various transceivers. A mobile program-ming setup is shown in Figure 1-1, and a portable setup is shown in Figure 1-2.

51xx Portable

● Programming cable from computer to transceiver, Part No. 023-5100-920. *NOTE: This cable, the -488 programming software, and the PDF file for this manual are included in Programming Kit, Part No. 250-5100-003.*

7780 Portable

● Programming cable from RPI to transceiver, Part No. 597-2002-123. *NOTE: This cable, the -488 programming software, and the PDF file for this manual are included in Programming Kit, Part No. 250-7780-002.*
● Remote Programming Interface (RPI), Part No. 023-9800-000

5300 Mobile

● Programming cable from RPI to transceiver, Part No. 023-5300-005. *NOTE: This cable, the -488 programming software, and the PDF file for this manual are included in 5300 Programming Kit, Part No. 250-5000-004.*

- Remote Programming Interface (RPI), Part No. 023-5300-000.

9800 Mobile

- Programming cable from RPI to transceiver, Part No. 597-2002-200. *NOTE: The above items, the -488 programming software, and the PDF file for this manual are included in 9800 Programming Kit, Part No. 250-9800-002.*
- Remote Programming Interface (RPI), Part No. 023-9800-000

Connecting Mobile Transceivers To Computer

With 5300 transceivers, only RPI, Part No. 023-5300-000, can be used. Other RPIs such as 023-9800-000 and 023-9750-000 are not compatible with this transceiver.

With 9800 transceivers, earlier RPIs such as Part No.s 023-5810-000 and 023-9750-000 can also be used. However, the 023-9800-000 version is required for other functions such as Flash programming and tuning.

The Radio Programming Interface (RPI) provides the required logic interface between the computer and transceiver. The cable from the RPI to computer is not included with the RPI or in the programming kit. The current RPI's have a female DB9 connector, and most computer serial ports have a male DB9 or DB25 connector. Therefore, a male DB9 to female DB9 or DB25 cable is usually required. This is a standard cable available at most computer supply stores or order 6 ft. DB9M to DB9F cable, Part No. 597-5900-002.

The cable from the RPI to the transceiver is not included with the RPI, but it is included with the programming kits or can be ordered separately as previously described.

This cable plugs into the microphone jack of standard front or remote mount transceivers. With 5300 transceivers using the Handheld Control Unit (HHC), the connection point is the 10-pin programming jack on the HHC junction box via a special adapter plug (Part No. 023-5300-140). If the HHC is not equipped with the junction box (Part No.023-5300-130), it is also required for programming.

Connecting Portable Transceivers To Computer

NOTE: Although they may look the same, the 5000 portable programming cable cannot be used to program a 5100 portable and vice versa.

5100 Series - No RPI is required because the radio contains the interface circuitry. The programming cable has a female DB9 connector for connecting to the computer.

7780 - The 9800 RPI and programming cable listed in the preceding information are required. The RPIs used to program the 5100 and 5300 are not compatible. The programming cable connects to the accessory jack on the side of the transceiver.

As with mobile transceivers, the cable between the RPI and computer is not included with the RPI. Refer to preceding description for more information.

1.2 COMPUTER DESCRIPTION

The computer used to run this program must meet the following minimum requirements:

- Windows® 95/98/NT/2000/XP (3.1 cannot be used)
- Pentium® processor or equivalent
- At least 16 MB of RAM
- A hard disk drive with at least 4 MB of free space
- A CD-ROM drive
- An available serial port

1.3 OPERATING AND SERVICE MANUALS

This manual includes brief descriptions of the various programmable parameters. For detailed radio operating information, refer to the applicable radio operating or service manuals which are as follows. With the 5100/5300, both the operating and service manuals contain operating information, so either can be used.

5100 Portable	CD Op Man, P.N. 002-5100-1005CD
	CD Serv Man, P.N. 001-5100-0015CD
5300 Mobile	CD Op Man, P.N. 002-5300-009CD
	CD Serv Man, P.N. 001-5300-009CD
7780 Portable	Service Manual, P.N. 001-7780-500
9883 Mobile	Serv Man Addend, P.N. 001-9800-500
	Operating Man, P.N. 002-9800-503
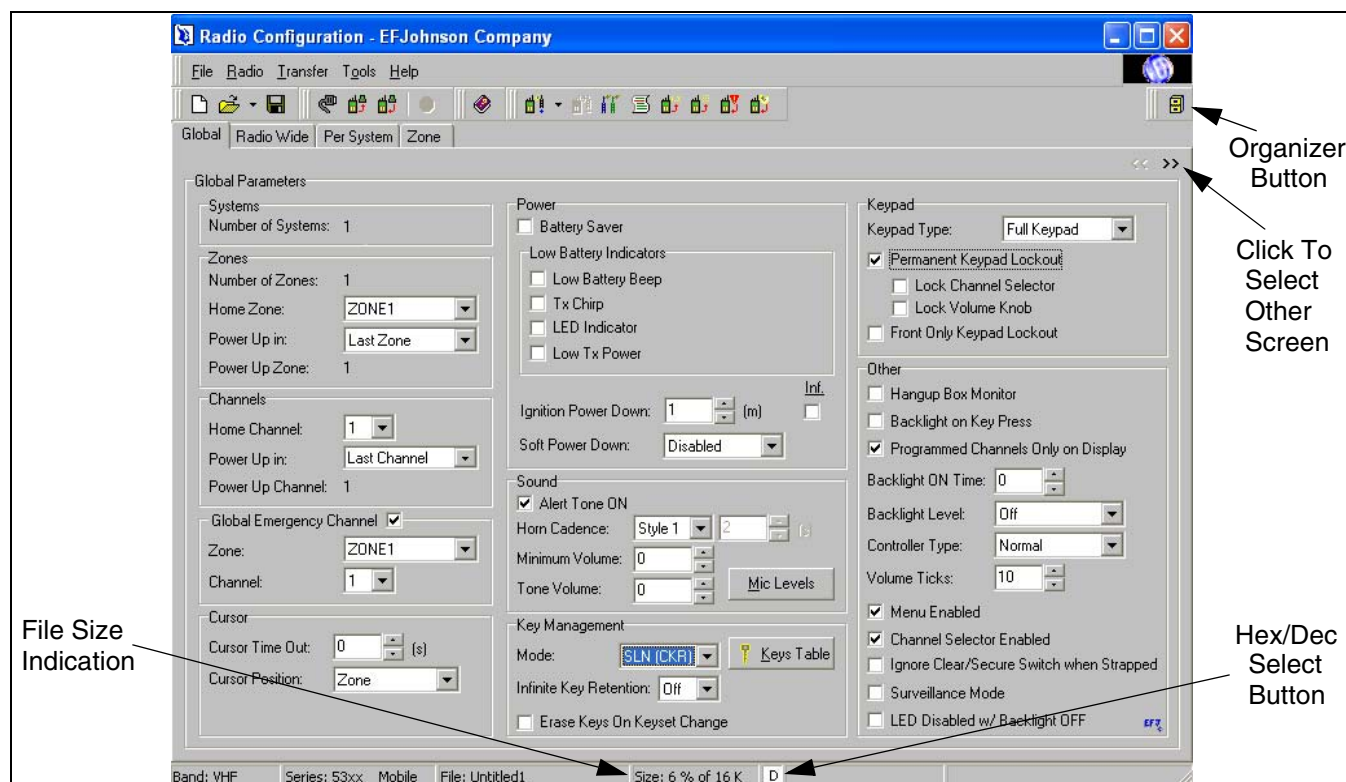
Figure 1-3 Main Screen (Global Screen Shown)

1.4 SOFTWARE INSTALLATION

NOTE: Before completely removing an old version of PCConfigure, be sure to transfer the files in the Data and Keys folders to those folders of the new version.

1. Make sure that there are no other applications open during this installation procedure. Also, make sure that the computer meets the minimum requirements listed in the preceding section.

2. Insert the PCConfigure CD-ROM in the CD drive of your computer.

3. In the lower left corner of the screen, select Start > Run and then click the Browse button. Select the CD-ROM drive and the file "PCConfigurex_x.exe" (x_x is the PCConfigure version number). Click the Open button and then from the Run window, click OK and the installation process begins.

4. Follow the on-screen instructions. The default directory for the program is \Program Files\EF Johnson\PCConfigure. This directory can be changed during installation if desired.

1.5 STARTING AND EXITING

To Start PCConfigure

Click the Start button and select the PCConfigure group. Then click the PCConfigure icon.

To Exit PCConfigure:

Select File > Exit or press ALT and F4.

1.6 PROGRAMMING FILE TYPES

Programming data is stored in a disk file that can be saved, read, copied, and deleted (see Section 3.1). This file is automatically given the extension ".rcf".

1.7 HELP FILES

To display help information on the current screen, click Help in the menu bar.

NOTE: For a list of changes made with the various releases of this software, refer to the ReleaseNotes.txt file located in the PCConfigure program folder.

1.8 MAIN SCREENS

Four different screens can be selected by clicking the tabs at the top as shown in Figure 1-3. The functions of these screens are as follows:

Global - This screen is shown in Figure 1-3, and it programs parameters that are the same for all Conventional, Project 25 Trunked, SMARTNET™, and SmartZone® systems. Refer to Section 4 for more information on parameters in this screen.

Radio Wide - This screen programs the parameters that are the same for all programmed Conventional (P25 and analog), Project 25 Trunked, and SMARTNET/SmartZone systems (a different screen is displayed for each). The screen system type is selected in the System Specific box. Refer to Section 5 for more information on parameters in this screen.

Per System - This screen programs the parameters that are unique to each programmed system. The system to be edited is selected by clicking it in the Systems box. Refer to Sections 7.1, 8.1, and 9.1 for more information on parameters in this screen.

Zone - This screen programs the channels and zones. Unique channel parameters include system number and type, frequency, and talk group. Refer to Sections 7.2, 7.3, 8.3, and 9.3 for more information on parameters in this screen.

1.9 OTHER SCREEN INFORMATION

1.9.1 PROGRAMMABLE TITLE AND LOGO

The title that is displayed after "Radio Configuration" at the top of the screen (see Figure 1-3) is programmable using the Tools > Organization Identity menu item. This can be used, for example, to display a company name on the top line. In addition, the logo that is displayed on the right end of the menu bar can be customized. Refer to Section 3.4 for more information.

1.9.2 ORGANIZER

Clicking the organizer button on the right end of the toolbar displays a screen is used to organize the various programming files into groups and subgroups. This can make administrating the program-

ming files of a large organization easier. Refer to Section 3.8 for more information.

1.9.3 FILE SIZE INDICATION

The maximum number of channels that can be programmed may be limited by the available memory space in the radio. A running indication of the amount of memory used by the current data if it was downloaded to the radio is displayed as a percentage in the "Size:" box in the status bar on the bottom of the screen (see Figure 1-3). When this percentage reaches 100%, the available memory is full and some channels may need to be deleted if more information remains to be programmed.

1.9.4 DECIMAL/HEXADECIMAL SELECT

On some screens, such as the SMARTNET Talk Group, numbers can be entered using either a Decimal or Hexadecimal format. The format is selected globally which means that when a format is selected, it is selected for applicable numbers on all screens.

The currently selected format is indicated in the status bar on the bottom of the screen in the box next to the file size indication (see Figure 1-3). A "D" indicates the Decimal format is selected and an "H" indicates the hexadecimal format is selected. In addition, the background color is ivory for all numbers which must be entered in Hexadecimal, and white for Decimal and other entries.

To toggle between the Decimal and Hexadecimal formats, right click the H/D box and click Yes in the confirmation box that is displayed. This mode can also be toggled using the Tools > Preferences screen described in Section 3.4.

1.10 CREATING SYSTEMS

A system as used with these transceivers is a collection of channels or talk groups typically assigned to the same repeater site. Unique system parameters are shown in the Per System screen and include the scan list, various timers, and talk groups. Up to sixteen systems of any type can be created.

To create a new Conventional, SMARTNET, SmartZone, or Project 25 Trunked system, select

Radio > Add Systems in the menu bar and then select the desired system type (see Section 3.2). Alternatively, click ⬛ ▼ in the toolbar and select the desired system type from the drop down list. To view current and added systems, select the "Per System" screen and they are displayed in the "Systems" box. To delete a system, select it in the "Systems" box and then select the Radio > Delete System in the menu bar or ⬛ in the toolbar.

SECTION 2   PROGRAMMING PROCEDURE

The following is a general procedure that can be followed to program a transceiver.

2.1 PRELIMINARY

1. Select a programming file as follows:

Create a New File - To start with a new file containing default parameters, select File > New and then when the dialog box appears, select the frequency band of the radio: VHF, UHF 380 (380-470 MHz), UHF Low (403-470 MHz), UHF High (450-512 MHz), 800 MHz.

Open An Existing File - To open an existing file stored on disk, select File > Open and then the file-name to be opened.

Read a File From a Radio - To transfer a file from a radio to the computer for editing or use as a basis to program another radio, connect the radio to the computer as described in Section 1.1. Then turn the radio on and select Transfer > Read Parameters From Radio in the menu bar. Encryption parameters cannot be uploaded for security reasons. Refer to Section 3.3 for more information.

2. Be sure the correct radio type (such as the 5300-series mobile or 5100 portable) is selected by the Radio > Series menu (see Section 3.2).

3. With trunked operation, the correct system key must be selected on the Per system screen. Refer to Section 13 for more information.

NOTE: Some operating protocols and options may not be available with your radio. To display the options that have been factory enabled, select Transfer > Read Options From Radio (see Section 3.3).

2.2 CREATING SYSTEMS

A conventional system is automatically set up when a new programming file is created. Create the desired number and type of Conventional, SMARTNET, SmartZone, and/or Project 25 Trunked systems by selecting Radio > Add System or ⬛ ▼ in the toolbar. The Per System screen must be selected to view the current systems. Refer to Section 1.10 for more information.

2.3 ENTERING GLOBAL PARAMETERS

1. Display the Global Parameter screen by clicking the Global tab at the top of the screen.

2. Program the applicable parameters in this screen as described in Section 4. Parameters that do not apply to the selected Radio Series are grayed out.

2.4 ENTERING RADIO WIDE PARAMETERS

1. Display the Radio Wide screen by clicking the Radio Wide tab at the top of the screen.

2. Program the applicable parameters for all Conventional, SMARTNET/SmartZone, and/or Project 25 Trunked systems as described in Section 5.

NOTE: The Radio Wide Scan List cannot be programmed until the channels are set up as described in the next section.

2.5 SETTING UP ZONES AND CHANNELS

1. Display the Zone screen by clicking the Zone tab at the top of the screen.

2. Set up Zones and Channels as described in Section 6. Zones can include up to 16 channels of any type from any system.

2.6 ENTERING CONVENTIONAL SYSTEM AND CHANNEL PARAMETERS

NOTE: If no conventional channels are programmed, proceed to Section 2.7.

1. Display the system programming screen by clicking the Per System tab at the top of the screen.

2. Select the system in the left pane and program the applicable parameters for each Conventional system as described in Section 7.1. *NOTE: It may be necessary to further define the channels as described in the next steps before programming the standard scan lists.*

3. Display the Zone screen by clicking the Zone tab at the top of the screen. Program the individual channel information of each Conventional channel in each zone as described in Sections 7.2 and/or 7.3.

4. If necessary, program the standard scan lists in each system (see preceding step 2). After all channel information is programmed, program the Radio Wide scan list in the Radio Wide screen (see Section 2.4).

2.7 ENTERING SMARTNET/SMARTZONE SYSTEM AND CHANNEL PARAMETERS

NOTE: If no SMARTNET or SmartZone channels are programmed, proceed to Section 2.8.

1. Display the system programming screen by clicking the Per System tab at the top of the screen. Make sure the correct System Key is selected as described in Section 13.

2. Select the system in the left pane and program the applicable parameters for each SMARTNET and SmartZone system as described in Section 8.1. *NOTE: It may be necessary to further define the channels as described in the next steps before programming the various system lists.*

3. Display the Zone screen by clicking the Zone tab at the top of the screen. Program the individual channel information of each SMARTNET and SmartZone channel in each zone as described in Section 8.3.

4. If necessary, program the system lists (see preceding step 2). After all channel information is programmed, program the Radio Wide scan list in the Radio Wide screen (see Section 2.4).

2.8 ENTERING PROJECT 25 TRUNKED SYSTEM AND CHANNEL PARAMETERS

NOTE: If no Project 25 Trunked channels are programmed, proceed to Section 2.9.

1. Display the system programming screen by clicking the Per System tab at the top of the screen. Make sure the correct System Key is selected as described in Section 13.

2. Select the system in the left pane and program the applicable parameters for each Project 25 Trunked system as described in Section 9.1. *NOTE: It may be necessary to further define the channels as described in the next steps before programming the standard scan lists.*

3. Display the Zone screen by clicking the Zone tab at the top of the screen. Program the individual channel information of each Project 25 Trunked channel in each zone as described in Section 9.3.

4. If necessary, program the standard scan lists in each system (see preceding step 2). After all channel information is programmed, program the Radio Wide scan list in the Radio Wide screen (see Section 2.4).

2.9 PROGRAMMING RADIO (WRITING FILE)

When all the required programming information has been entered in the various programming screens, the information can be written (downloaded) into the radio. When writing a file, be sure that all connections between the computer and radio are secure, the radio is turned on, and the proper serial port is selected (see Section 3.3). Then proceed as follows:

1. Select Transfer > Write Parameters To Radio from the menu bar.

2. If no file is currently loaded, a dialog box appears to select the desired file. Otherwise, the current file is transferred to the radio.

SECTION 3   MENUS, TOOLBAR, AND STATUS BAR

3.1 FILE MENU
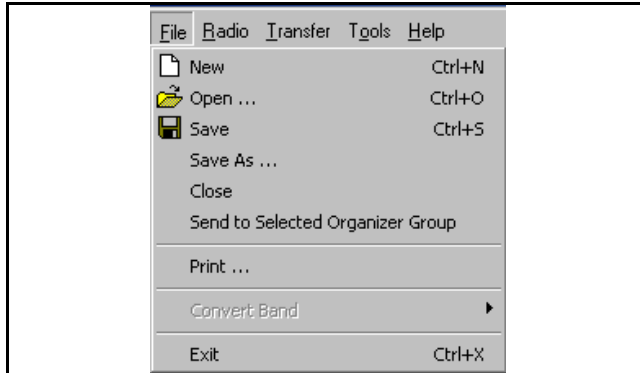
New - Creates a new programming file named "Untitled.rcf" containing default parameters and displays a dialog box for selecting the frequency range.

Open - Opens a programming file that was previously saved to disk. If a modified file is currently open, you are asked if that file should be saved before the new file is opened.

Save - Saves the current file to disk using the current file name. If it is the first time a New file is being saved, the following Save As screen is displayed to specify the file name and destination.

NOTE: It is no longer possible to save any type of new programming file to disk without a radio connected. Refer to Section 15 for more information.

Save As - Saves the current file to disk and displays a screen for changing file name and destination if desired.

Close - Closes the current file without exiting the program so that another file can be opened or created if desired. If the current file has been modified and the changes have not been saved, you are asked if the changes should be saved before closing.

Send to Selected Organizer Group - Adds the current file to the group that is selected in the Organizer. Refer to Section 3.8 for more information.

Print - Prints the information in the current file. A screen is displayed to select if Global, Radio Wide, Per System, and/or Zone information is printed.

Convert Band - If the current file type is UHF 380 (selected when it is created by File > New), this can be used to change it to the UHF LO type and vice versa.

Exit - Closes the PCConfigure program. If the current file has been modified and the changes have not been saved, you are asked if the changes should be saved before closing.

3.2 RADIO MENU

Series - Selects the specific radio being programmed. Only parameters which apply to that radio are then displayed and others are grayed out.

Add System - Adds a new Conventional, SMARTNET, SmartZone, or P25 Trunking system as described in Section 1.10. "Multi-Net" is reserved for future use.
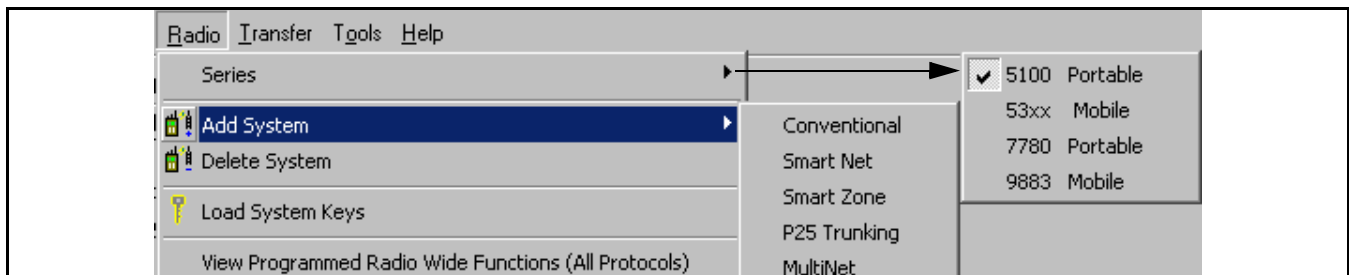
Radio Menu

Delete System - If two or more systems have been set up, this function deletes the system that is currently selected in the Per System screen.

Load System Keys - Allows the system keys to be loaded from a folder other than the default "Keys" folder. A dialog box is displayed to select the desired folder. Refer to Section 13 and "Preferences" in Section 3.4 for more information.

View Programmed Radio Wide Functions (All Protocols) - Displays the screen shown below which indicates the functions that have been assigned to the programmable option buttons on the Radio Wide screen (see Section 5.4). These buttons can be programmed for a different function in each mode (conventional, SMARTNET/SmartZone/P25 Trunked). Up to two modes selected by the drop down lists are displayed.
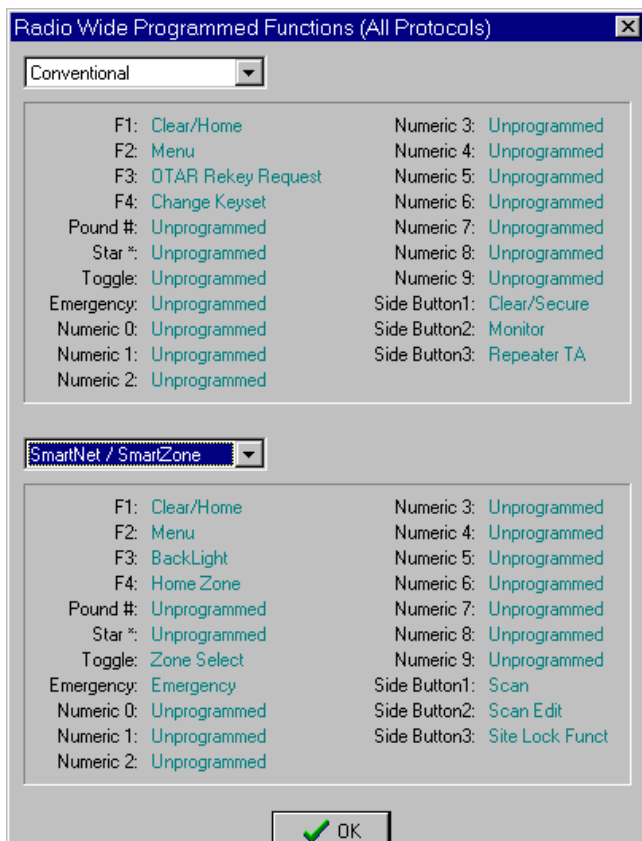
3.3 TRANSFER MENU

NOTE: To stop a data transfer in progress, click 🔴 *in the toolbar (see Section 3.6).*

Comports - Displays a dialog box which selects the serial port used to program the transceiver (see Section 1.1). The default is COM1, and the last selected port is saved and then automatically reselected whenever the program is started. Refer to Preferences in Section 3.4 for more information.
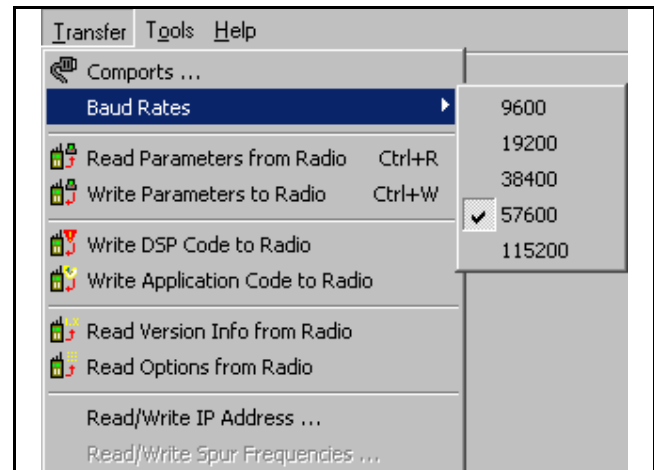
Transfer Menu

Baud Rates - Select 9600 baud for standard programming of the 7780 portable, 9883 mobile, and 5300 mobiles with the Rev 4 logic board. All 5100 portables and all 5300 mobiles with Rev 6 or later logic boards use the 19200 baud rate. DSP and ARM code download functions can be performed at the higher baud rates, including 115200. The default baud rate is 19200. Refer to Preferences in Section 3.4 for more information.

Read Parameters From Radio - Transfers the information programmed in a transceiver into a new programming file. If the current file has not been saved when this function is selected, a dialog box is displayed to allow it to be saved if desired. The transferred data can be viewed, edited, or saved to a disk file as desired. An upload password may have to be entered. Refer to Section 10 for more information.

Write Parameters To Radio - Programs the transceiver connected to the computer with the data in the current programming file. Use the 115200 baud rate. A download password may have to be entered. Refer to Section 10 for more information.

NOTE: Later 51xx/53xx models have safeguards to prevent unauthorized cloning. Refer to Section 15 for more information.

Write DSP Code To Radio - Reprograms early 5300 radios (see Section 16) and also 9883 radios with updated DSP operating code (more info. follows).

Write Application Code to Radio - Programs all 5300 and 5100 radios with updated firmware (operating software). With "F" and earlier 5300 radios, this code is referred to as ARM code. Proceed as follows:

1. A special computer file containing the operating code must be obtained from EFJohnson. The Application (ARM) code has a ".hex" extension, and the DSP code has an ".out" extension. With early 53xx ARM models, copy the .hex file to the ARM\5300 folder of the PCConfigure program, and the .out file to the DSP\5300 folder. With later 53xx models, copy the .hex file to the PPC\5300_i folder, and with all 51xx models, copy it to the PPC\5100 folder. Other locations can also be used if desired.

2. Put the radio in the firmware programming mode as follows.

   53xx - Turn power on with the special Flash Mode Select Plug, Part No. 023-5300-010, plugged into the microphone jack. Alternately, short pin 3 to 7. With the HHC, plug it into the programming adapter plug that is plugged into the junction box programming connector.
   51xx - Turn power on with the option button above the PTT switch pressed.
   98xx - Turn power on with the PTT sw pressed.

3. Select the 115,200 baud rate with the 5100 and the 57,600 rate with the 5300.

4. If applicable, <u>make sure that the radio is connected to the computer and then select this function</u>. Enter the password (obtained from the EFJohnson Company) in the screen that is displayed and click the OK button.

5. The following screen is then displayed. Select the loader and code files if required by clicking the "Change" button. The loader file is included with PCConfigure software. In some cases, an updated loader file may be required and would then need to be selected instead of the included loader file. The operating code file should be in the folder selected in step 1.

6. Click the Start button to begin code downloading (try clicking Start again if a failure occurs). Writing may require 20 minutes or more. With the early 53xx, repeat for DSP code if applicable.

NOTE: After downloading is complete, perform "Read Parameters From Radio" and then "Write Parameters To Radio" to ensure that the file format is correct.
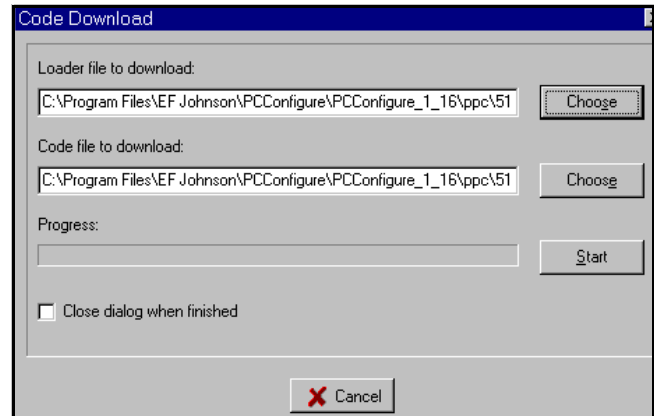
Read Version Info From Radio - Transfers version information on the software the radio contains and then displays it as shown below.
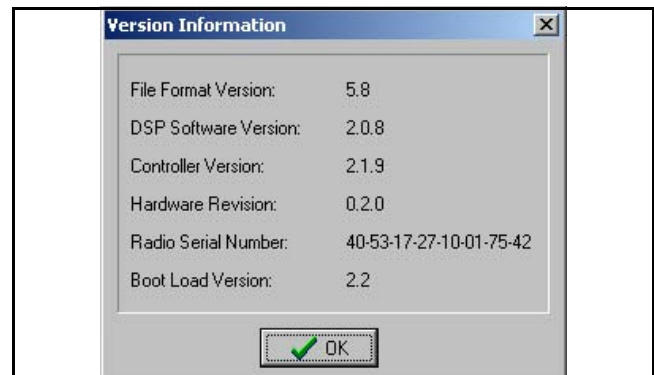
Read Options From Radio - Displays information on which options have been enabled in the radio as shown in Figure 3-1. The check boxes indicate which options are enabled. They are for informational purposes only and cannot be edited.

The "Update Options" button is used to add additional options that have been purchased for the radio. An encrypted data file keyed to the radio serial number is provided to unlock these options. This file has an
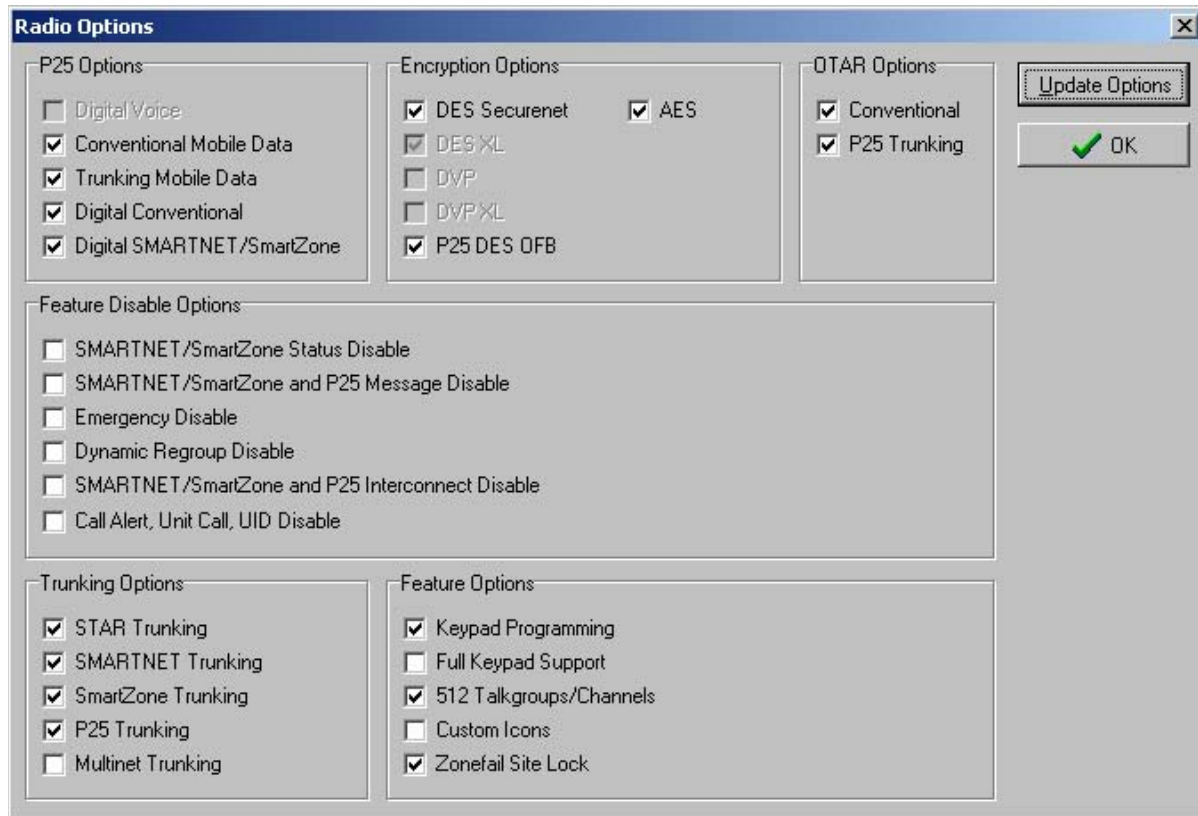
Figure 3-1   Transfer > Read Options Screen (5300 Shown)

".opt" extension and is selected and downloaded by a screen that is displayed when this button is clicked.

Read/Write IP Address (5100 only) - This function is not used because an Ethernet link to the radio is currently not supported. It displays the following "IP Address" screen which reads/edits the IP address stored in the radio.
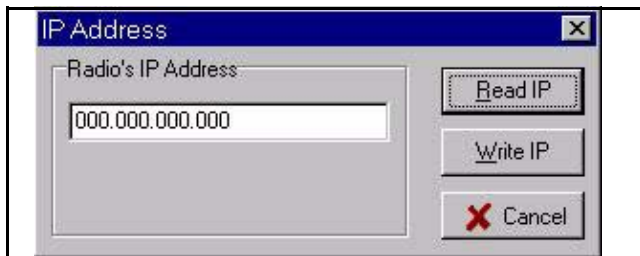
Read/Write Spur Frequencies (7780 only) - Displays the following "Spur Frequencies" screen which is used to read and write spurious frequencies. When a frequency in this table is selected by the radio, the internal crystal frequency is shifted slightly to minimize receive noise caused by these signals.
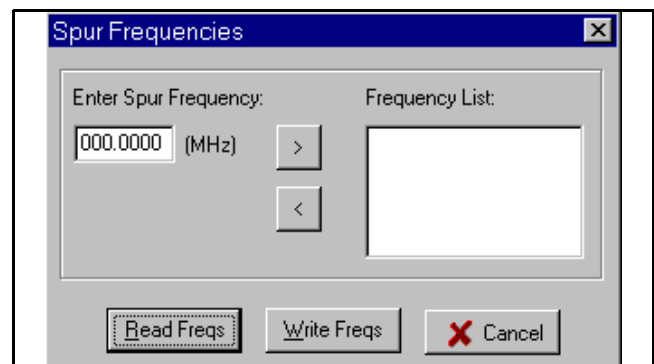
3.4 TOOLS MENU
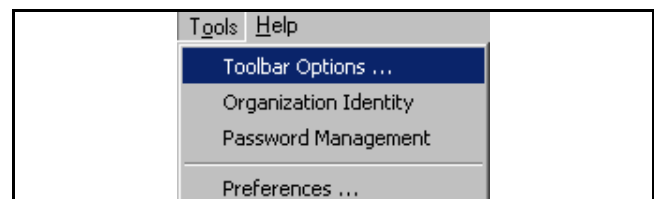
Toolbar Options - Displays the following dialog box which is used to select the icons that are displayed in the toolbar (see Section 3.6). When the "Custom" box

is checked and <u>highlighted</u>, the additional window shown below is displayed to select which icons to display. The last selected configuration is saved and then automatically reselected when the program is restarted.
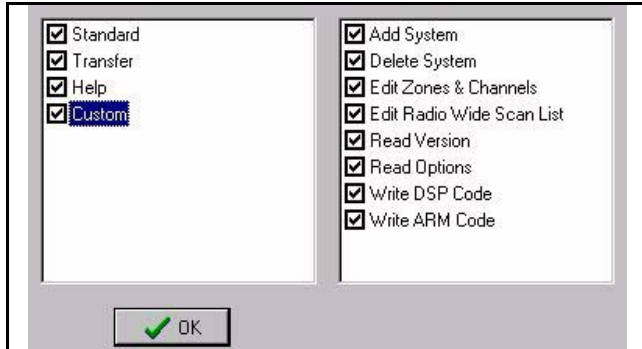
Organization Identity - Displays the following screen which can be used to display a unique company title and logo on the programmer screen. To display a unique company name, enter the desired name in the "Organization's Name" box in this screen. It is then displayed after "Radio Configuration" at the top of the screen (see Figure 1-3).
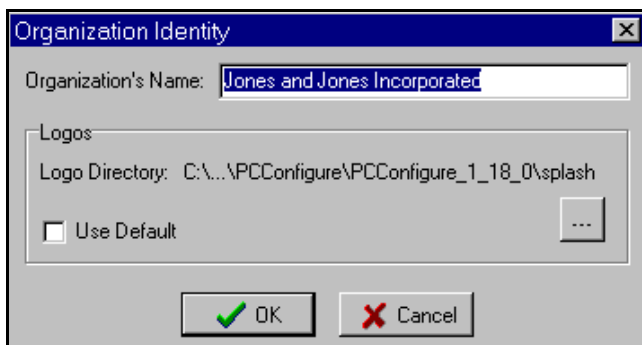
A logo is displayed on the right end of the toolbar, and when a radio read or write operation is occurring, this logo changes. To display the default logo, check the Use Default box. To display a custom logo, create a bitmap file of the desired graphic that meets the following requirements. A photo editing program such as Photoshop® or Paint Shop Pro® can be used.

- 53 W x 22 H pixels
- .bmp file format
- 256 colors or higher recommended
- Up to 30 files can be created named Logo1.bmp, Logo2. bmp, and so on up to Logo30.bmp. These graphics are then displayed in rapid succession during a radio read or write operation.

Password Management - Displays the following screen which is used to enable, disable, and change radio passwords. A radio must be connected to display this screen. Actual passwords are never displayed in this screen. Passwords, no matter what the length, are always represented by eight asterisks (********).
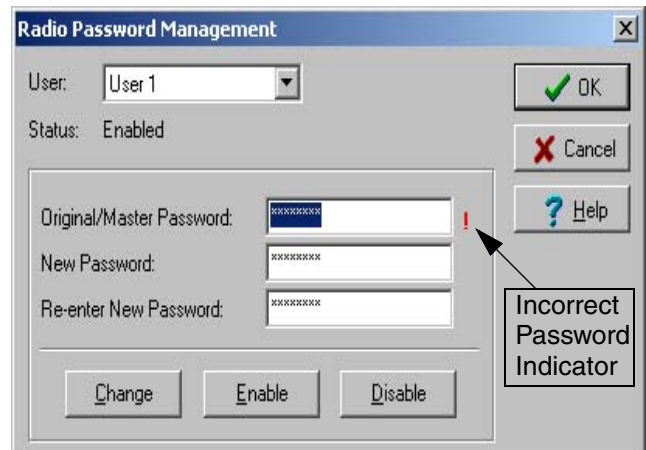
NOTE: This is a new feature available only with later 5100 and 5300 radios with updated firmware. The power-up password previously programmable on the global screen with earlier models can be programmed in those models only with PCConfigure, Version 1.21.6 or earlier. Refer to Section 10 for more password information.

   User - This drop down list selects the particular password being changed as follows

   <u>User 1, User 2, User 3, User 4</u> **-** Up to four different power-on passwords can be programmed. Currently, the same user features are available with each.

   <u>Upload, Download</u> **-** These passwords are required to Upload (read) or Download (write) program-ming parameters. A preceding "User" password is not required to upload or download parameters.

   <u>Master</u> **-** This password overrides all the other pass-words. It can be used by a system administrator or if any of the above passwords are lost.

   Selected User - This box indicates status of the selected password (Enabled or Disabled). The Pass-word box always indicates eight asterisks and is not editable.

Proceed as follows to set up or change a password. Passwords must be 1-8 characters in length and consist of numbers 0-9. Zeros are valid characters in any location, even as leading characters.

Changing a Password

NOTE: To enter a password, click the first asterisk or select all eight asterisks. If an incorrect password is entered, a red "!" exclamation point is displayed to the right of the box (see preceding screen) and the password must be re-entered.

1. Select the password in the drop down list.

2. If the password was previously set up, enter the current password in the Original/Master box.

   If this is the first time the password is used, it initially consists of null (deleted) characters. In this case, do not enter anything in this box.

3. If the password is simply being enabled or disabled, click the appropriate Enable or Disable button. Proceed to step 6.

4. If the password is being changed or initially set up, enter the new password in the New Password box and then re-enter it in the Re-enter New Password box to confirm it. Click the Change button.

5. Repeat for other passwords as required.

6. To exit without sending the change to the radio, click the Cancel button. To exit and send the change to the radio, click the OK button.

Preferences - Displays the following screen which sets several program preferences.

On New

When "Always" is checked, a programming file with the Radio Series and Band selected by the drop down lists is automatically created in a single step by File > New or the 🗋 button. However, the Band of a file then cannot be changed, so only files with the selected Band can be created. If this is not checked, the Band is selected in a separate step before the file is created (see following).
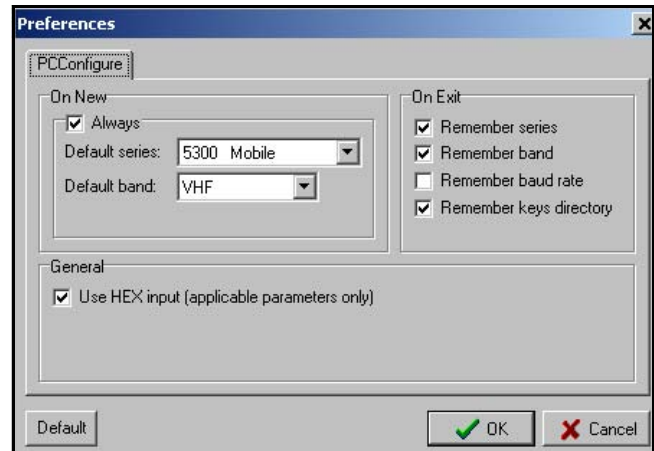
On Exit

When checked, the parameter is restored to the current condition when the program is restarted. Otherwise, the default is selected. Note that the first two parameters are overridden by the preceding "On New- Always" if it is checked.

Remember Series - The current Radio Series is automatically selected whenever a new file is created by selecting File > New or the 🗋 button. If this is not selected, "5300" is the default.

Remember Band - The current frequency Band is highlighted (and can be changed if desired) when the Band select screen is displayed by selecting File > New or the 🗋 button. If this is not selected, "VHF" is the default.

Remember Baud Rate - The currently selected baud rate is automatically reselected (see Section 3.3). If this is not selected, "19200" is the default.

Remember Keys Directory - The currently selected key directory is automatically reselected. If this is not selected, the "Keys" folder is the default (see "Load System Keys" in Section 3.2).

General

Use Hexadecimal Input - When selected, all applicable numbers are entered in Hexadecimal format instead of Decimal format. All Hexadecimal numbers are indicated by an ivory-colored background. Refer to Section 1.9.4 for more information.

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3.5 HELP MENU

Contents - Displays the help system table of contents.
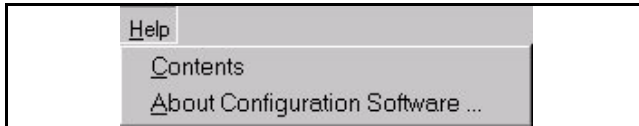
About Configuration Software - Displays the PC Configure version number and company information.

3.6 TOOLBAR

The tools in the toolbar provide quick access to many menu functions. The tools that are displayed are selected by the Tools > Toolbar Options menu described in Section 3.4. The Standard, Transfer, Help, and Custom tools can be turned on and off by this menu.

3.6.1 STANDARD TOOLS

Refer to Section 3.1 for more information on these functions.

New - Opens a new programming file containing default parameters.

Open - Loads a file from disk. Clicking the down arrow displays a drop-down list of recently loaded files.

Save - Saves the current file to disk.

3.6.2 TRANSFER TOOLS

Refer to Section 3.3 for more information on these functions.

COM Port - Selects the serial port used to connect the radio to the computer.

Read Parameters From Radio - Transfers data from the radio to a new programming file.

Write Parameters To Radio - Programs the radio with the data in the current programming file.

Stop Data Transfer - Cancels the data transfer in progress.

3.6.3 HELP TOOLS

Help - Displays help information.

Manual - Reserved for future use.

3.6.4 CUSTOM TOOLS

Add System - Adds a new system. Clicking the down arrow displays a drop-down list of the system types that can be added.

Delete System - When the Per System screen is displayed, clicking this button deletes the selected system.

Edit Zones and Channels - Displays the Edit Zones and Channels screen.

Edit Radio Wide Scan List - Displays the Radio Wide Scan List edit screen.

Read Version From Radio - Reads version information from the radio for the software it contains and then displays that information.

Read Options From Radio - Reads option information from the radio and then displays it.

Write DSP Code To Radio - Programs 98xx and early 53xx models with new DSP software.

Write Application Code To Radio - Programs the radio with new Application/ARM software.

3.7 STATUS BAR

The status bar which follows indicates the following information:

Band: VHF   Series: 5100 Portable File: Untitled1   Size: 6 % of 16 K   D   Read Parameters from Radio

Decimal/Hexadecimal Indicator   Information

Status Bar

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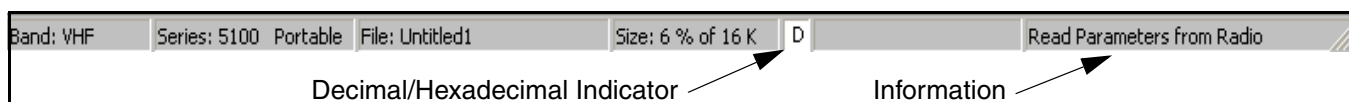
Band - The frequency band of the file. This is selected when a new file is created by the File > New function.

Series - The Radio Series of the file selected by the Radio > Series function.

File - The file name of the current programming file. This name is specified the first time the file is saved by the File > Save function or it can be changed by the File > Save As function.

Size - Indicates the percent of the available memory space that would be used if the radio was programmed with the current file (see Section 1.9).

D/H Box - Indicates if the Decimal or Hexadecimal number format is selected (see Section 1.9.4).

Information - Displays a short description of tools in the toolbar when they are selected by the cursor.

3.8 ORGANIZER

Clicking the organizer button on the right end of the toolbar toggles the following screen which can be used to organize a large number of programming files into groups and subgroups for easier identification when administering a large organization.
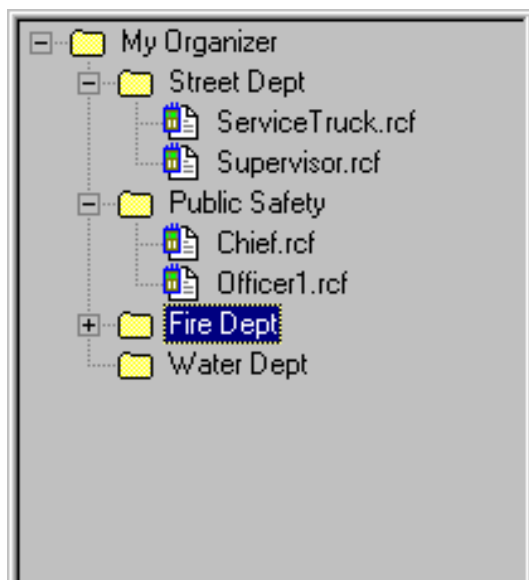
Organizer Screen

NOTE: This organizer does not add, delete, or move programming files on the hard drive. It simply organizes those files into logical folders and subfolders.

Groups are indicated by a folder symbol , and programming files are indicated by a symbol. A ▭ symbol next to an item indicates that the branch is expanded, and clicking it collapses the branch. Likewise, a ⊞ symbol indicates that the branch is collapsed, and clicking it expands the branch. If a file in the organizer has been deleted from the hard drive, it is indicated by a red "X" through the icon .

1. To add the current programming file to the Organizer, select the desired Group in the Organizer and then select the File > Send to Selected Organizer Group menu item (see Section 3.1). To add other files, see step 3.

2. To open a file listed in the Organizer, simply double click it, drag it to the main programmer screen, or select "Open" as described in the next step.

3. To add, edit, delete, or move a group or file, right click the applicable group or file and the following screen is displayed.
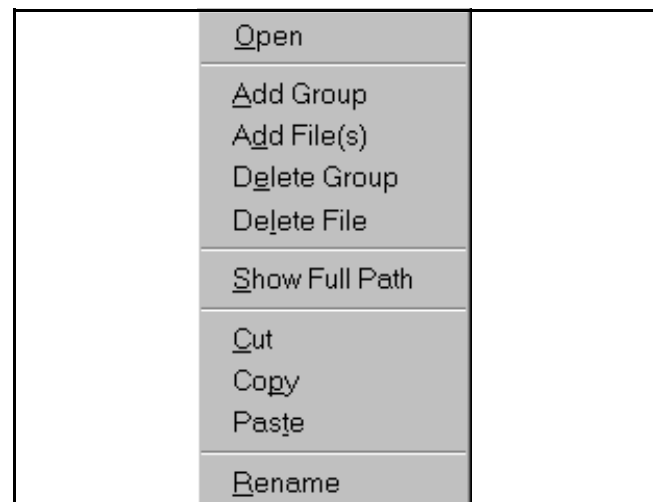
Open - Opens the selected file. If the current file has not been saved, you are asked if you would like to save it first.

Add Group - Adds a new group below the selected location.

Add File(s) - Displays a screen that is used to select a file on the hard drive to add to the selected location.

Delete Group - Deletes the selected Group from the Organizer only (the actual files on the hard drive are not deleted).

Delete File - Deletes the selected File from the Organizer only (the actual file on the hard drive is not deleted).

Show Full Path - Displays the entire path name of the file on the hard drive.

Cut - Moves the selected Group or File to the clipboard.

Copy - Copies the selected Group or File to the clipboard.

Paste - Copies the current file on the clipboard to the selected location

Rename - Renames the selected Group. Files cannot be renamed from the Organizer.

SECTION 4   GLOBAL SCREEN PARAMETERS
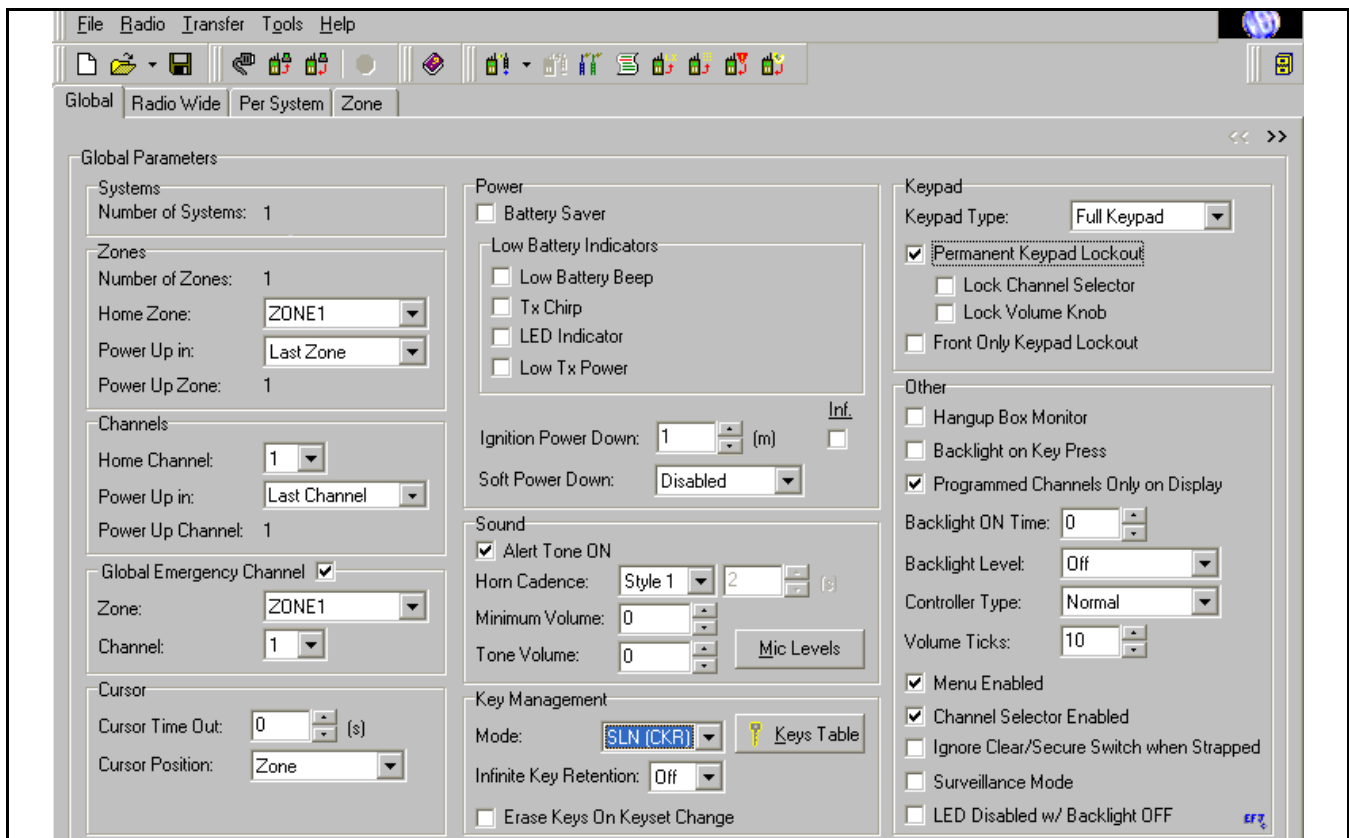
Figure 4-1   Global Parameter Programming Screen

4.1 INTRODUCTION

The Global screen shown in Figure 4-1 programs parameters that are the same for all systems, channels, and zones. Only parameters that apply to the selected Radio Series are displayed and the others are grayed out. The parameters in this screen are as follows:

NOTE: Passwords have changed and are no longer programmed on this screen. Refer to Sections 3.4 and 10 for more information.

4.2 PARAMETER DESCRIPTION

Systems

Displays the number of systems that have been created as described in Section 1.10.

Zones (A zone is a programmed collection of up 16 channels of any type.)

<u>Number of Zones</u> - The total number of zones currently set up. The maximum number allowed is 16. Zones are created in the Zone > Edit Zones screen by clicking the "+" button (see Section 6.2).

<u>Home Zone</u> - Selects the zone that is selected by the Home Zone option function button (if programmed).

<u>Power Up In</u> - Selects if the transceiver powers up on the Home or Last Selected zone.

<u>Power Up Zone</u> - When data is uploaded from a radio, this number indicates the power-up zone in the radio. It does not change until the current data is downloaded and then uploaded again.

Channels

<u>Home Channel</u> - Selects the channel that is selected by the Home Zone function button (if programmed) and when the transceiver powers up on the Home channel. With the 51xx, this is selectable only if the channel selector switch is disabled (see "Channel Selector Enabled" parameter on page 23).

<u>Power Up In</u>* - Selects if the Home or Last Selected channel is selected on power up. With the "Last Zone"/"Home Channel" power up configuration, the programmed home channel number of the last active zone is selected. If that channel number is not programmed in the active zone, "Unprogrammd" is displayed. With the 51xx, only "Home Channel" is not available if the channel selector switch is enabled.

<u>Power Up Channel</u> - Indicates the power-up channel in the radio similar to the power-up zone just described.

Global Emergency Channel**

Selects the zone and channel on which all emergency calls and alarms are transmitted regardless of the type of channel currently selected. For example, if the global emergency channel is a conventional channel and a trunked channel is selected when the emergency is initiated, it is transmitted on the conventional global emergency channel.

Cursor (53xx Mobile Only)

<u>Cursor Time-Out</u> - Programs the time delay that occurs before the cursor (zone or channel select indicator) returns to the default position programmed in the next parameter. Times of 0-255 seconds can be programmed ("0" selects no return).

<u>Cursor Position</u> - Selects if the Zone or Channel select mode is enabled when power is turned on and after the preceding time-out period expires.

Battery Saver (Portables Only)

If this is checked, 51xx and 7780 portables automatically switch to the low transmit power mode when the RSSI signal indicates the site is probably nearby (when operating in the SMARTNET/SmartZone or P25 trunked modes only).

Low Battery Indicators (Portables Only)

<u>Low Battery Beep</u> - When checked, a short tone sounds periodically in the standby mode while a low battery condition is being detected.

<u>Tx Chirp</u> - When checked, a chirp sounds each time the PTT switch is pressed while a low battery condition is being detected.

<u>LED Indicator</u> - When checked, the LED on the top panel indicates a low battery condition. For example, the 51xx indicator flashes red in the receive mode.

<u>Low Power</u> - When checked, low transmit power is automatically selected while a low battery condition is being detected.

Ignition Power Down (Mobiles Only)

When the ignition switch controls transceiver power, this sets the delay that occurs between when the ignition switch is turned off and when transceiver power actually turns off. Times of 0-254 minutes or an infinite time (no turn-off) can be selected.

Soft Power Down (51xx Only)*

The soft power down feature prevents radio power from being turned off by accidentally turning the top

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* This feature available only in 51xx models with Flash code 1.9.0 or later and (if applicable) 53xx models with ARM code 1.22.0 or later.

** This feature available only in 51xx/53xx models with Flash code 2.x or 3.x (see Section 16).

panel on-off/volume control. Any side option button can be programmed for this function (in addition to its normal function). Then for power to turn off, this button must be pressed during or just after power is turned off by the on-off/volume control.

Sound

Alert Tone On - If checked, all supervisory tones sound. If not checked, no tones sound.

Horn Cadence (53xx Only) - Programs the following styles when the horn alert is enabled by the horn alert option switch. Repeating does not occur with either style.

> Style 1 - The horn is on for 1 second and off for 0.5 second for three cycles.

> Style 2 - The horn sounds continuously for the programmed time (2-255 seconds).

Minimum Volume (Mobiles and 5100 Portable) - Sets the minimum volume level that can be selected by the volume control. This can be used to prevent missed messages caused by inadvertently turning the volume down too far. Relative levels of 0-255 in steps of 15 can be set ("0" sets the lowest minimum volume).

Tone Volume* - This adjusts the alert tone volume level relative to the volume control setting. This can also be done by a Tone Volume Edit option button if programmed. Changes made by this button permanently override this setting. Relative levels of –170 to +170 can be set with "0" the standard default setting.

Mic Levels - Displays the following screen which sets the microphone sensitivity for various types of calls. Relative levels of 0 (less sensitive) to 4 (most sensitive) are set for Analog, Digital, and SecureNet® (encrypted) calls with "4" the default. This can only be set with 51xx models which have Version 1.6.0 or higher Flash code, and 53xx models must have Version 1.38.0 or higher DSP code (or any 2.x/3.x code with both models).
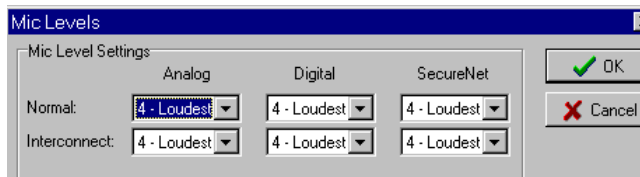
Key Management

The following modes select the method used to load and manage encryption keys. The Motorola keyloader has ASN and Astro 25 modes. The ASN mode can load analog channel keys (DES/DES-XL) only, and the Astro 25 mode can load both analog and digital (DES-OFB/AES) channel keys.

Mode - Select the PID/ASN or SLN/CKR mode as follows. Note that the keyloader can operate in only the ASN mode when PID/ASN is selected, and in either the ASN or Astro 25 mode when the SLN/CKR mode is selected.

> **PID/ASN Mode -** Select this mode to load analog channel keys directly into a Key PID (Physical ID) from 0-15. Digital channel keys cannot be loaded in this mode, OTAR (Over-The-Air-Rekeying) is not available, and the Keys Table is not used.
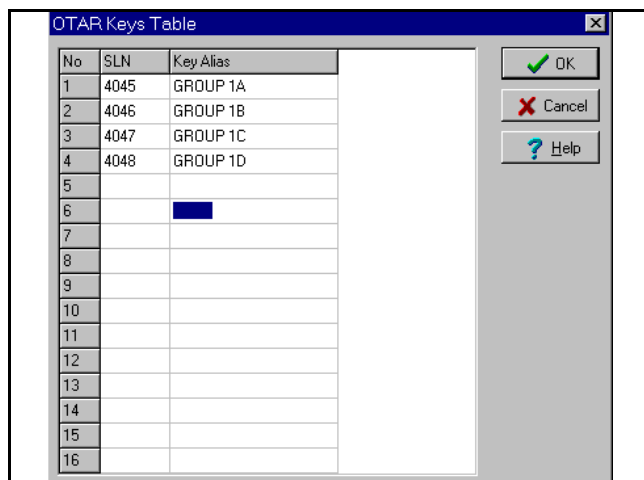
> **SLN/CKR Mode -** Select this mode to load keys into a SLN/CKR location from 1-4095 instead of a Key PID location from 1-16. This mode is also selected and to program the radio for OTAR. Up to 16 CKRs are specified, and the following key (alias) table links each CKR to a Key PID. SLN (Storage Location Number) and CKR (Common Key Reference) are equivalent terms.

> Keys Table - Clicking this button displays the following screen which associates Key PIDs 1-16 with the SLN/CKRs from 1-4095 specified when the key is loaded. This table must be programmed if the preceding SLN/CKR mode is selected. The SLN/CKR number points to a specific key or key slot of the two keysets with OTAR. The 10-character Key Alias is displayed briefly by the radio when transmitting, changing channels, and switching between the clear and secure modes.

Infinite Key Retention** - If "On" is selected, keys are stored in memory and are not lost when power is removed. If "Off" is selected, the keys are

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* This feature available only in 51xx models with Flash code 1.9.0 or later and (if applicable) 53xx models with ARM code 1.22.0 or later.

** This feature available only in 51xx models with Flash code Version 1.11.0 or later and 53xx models with ARM code 1.19 or later.

OTAR Keys Table Screen

maintained with power removed only until the storage capacitance discharges (approximately 8 hours with a 53xx mobile and 30 seconds with a 51xx portable).

Erase Keys on Keyset Change (OTAR Only) - If this is selected, the keys in the original keyset are erased when the OTAR Changeover command or the Keyset option switch is used to select the other keyset. If this not selected, the keys in the original keyset are not erased when this occurs.

Keypad (Portables Only)*

Keypad Type - Selects if the portable being programmed has a Full DTMF Keypad or a Limited Keypad (without the 0-9, *, # DTMF keys).

Permanent Keypad Lockout - If checked, the keys selected by the following "Front Only Keypad Lockout" parameter are disabled and cannot be re-enabled by the user. In addition, the following can then be selected and locked/unlocked by a side panel Keypad Lockout option key if side panel keys are enabled ("Front Only Keypad Lockout" selected).

Lock Channel Selector - If the preceding parameter is selected, checking this locks the top panel channel selector switch.

Lock Volume Knob - Likewise, if the preceding Permanent Keypad Lockout parameter is selected, checking this locks the volume control function (but not on-off) of the top panel on-off/volume control.

NOTE: The channel control can be totally disabled by the following "Channel Selector Enabled" parameter, and the volume control is totally disabled if an Up/Down volume button is programmed (see following "Volume Ticks" parameter).

Front Keypad Lockout Only - This controls the keys that are disabled by the preceding Permanent Keypad Lockout function or by the Keypad Lockout option button if programmed. If neither or these functions are used, checking this parameter has no affect. If checked, the front panel keys are disabled but the side panel keys remain active. If not checked, both the front and side panel keys are disabled.

Other

Hang-Up Box Monitor (Mobiles Only) - When checked, enables microphone off-hook detection. Taking the microphone off-hook then enables the monitor mode (conventional only) and disables scanning. When not checked, taking the microphone off-hook has no affect on these functions.

Backlight on Keypress (Portables Only) - If checked, the backlight turns on for the Backlight On Time whenever a key is pressed.

Programmed Channels Only on Display (53xx Only) - If checked, only programmed channels can be selected, and if not checked, all channels are displayed. When an unprogrammed channel is selected, "UNPROGRAMD" is indicated and a tone sounds.

Backlight On Time (Portables Only) - Programs the length of time in seconds that the backlight stays on after it is enabled by pressing a key (see preceding) or by the Backlight option switch. Times of 0-7.5 seconds in 0.5-second steps can be programmed.

Backlight Level (Mobiles Only) - Selects the backlight brightness as Off, Mid, or High whenever power is on. This setting can be overridden by the Backlight option switch if it is programmed.

Controller Type (53xx Only) - Selects the type of control head being used. "Normal" is selected with the standard front or remote mount control head, and "Handheld" is selected with the Handheld Control Unit.

* This operation applies only to 51xx models with Flash code Version 1.12.1/2.2.1/3.2.1 or later.

Volume Ticks (51xx Only)** - When a System Specific Volume Up/Down button is programmed on the Radio Wide screen, the volume control is disabled when a channel programmed for that operating mode is selected. This then selects the number of button presses (ticks) required to change from minimum to maximum volume. From 1-50 steps can be programmed. See also preceding "Permanent Keypad Lockout"

Menu Enabled (51xx Only) - Enables the menu mode with 51xx portables. The F1 and F2 keys then become menu exit and select keys instead of programmable option keys. If this parameter is not selected, the menu mode is not available and F1 and F2 are programmable option keys.

Channel Selector Enabled (51xx Only) - Enables the channel select knob in the top panel. If this is not checked, the channel select knob is disabled and channels can be selected only by the Channel Select option button or menu parameter. See also preceding "Permanent Keypad Lockout".

Ignore Clear/Secure Switch When Strapped* - When selected, the mode selected by the switch (or menu parameter with the 51xx) is ignored and the transmission always occurs in the strapped mode. In addition, the error tone and "Sec Only" or "Clear Only" are not indicated when the switch is selecting a different mode than what is strapped.

NOTE: If all channels/talk groups are strapped Clear or Secure and no Clear/Secure option switch or menu parameter is used, this parameter must always be selected (see following).

Without the Clear/Secure switch/menu, the radio is always in the last known state (usually Clear) and there is no way to change it. For example, if the last known state is Clear and this parameter is not selected, it is never possible to transmit a Secure message on a channel strapped Secure because all that happens is transmitting is disabled, an error tone sounds, and "Sec Only" is displayed.

Surveillance Mode - Disables the transmit/receive LED indicator, display and keypad backlight, and all alert tones. This provides a quick way of totally disabling these functions in all operating modes. It overrides any other programming of these functions such as a Tone or Backlight option switch.

LED Disabled w/Backlight Off (5300 Only)*** - When selected, the front panel transmit indicator is disabled whenever the display backlight is off. If it is not checked, this indicator operates normally regardless of the backlight state (except when the surveillance mode is selected).

4.3 PAGE 2 DESCRIPTION (53XX ONLY)

With the 53xx mobile only, a second Global screen which follows is opened/closed by clicking the ⟨⟨ ⟩⟩ buttons in the upper right corner of the screen. These additional parameters are then displayed:

Rx Audio to External PA - Microphone audio is always routed to the Ext PA line of the accessory cable. If this parameter is selected, the receive audio signal is also routed to this line.

External PA Display Indication - If this is selected, "Ext PA On" is indicated continuously in the display when the external PA function is enabled by the Ext PA option button. If it is not selected, "Ext PA On/Off is flashed in the display when a button is pressed.

Auxiliary B Output - Determines the function controlled by the horn output of the microcontroller. "Backlight" is selected to control the backlight of the Siren Controller, "Horn" is selected to control the horn alert, and "Disabled" is selected if neither is used.

Auxiliary B Input - Ext Emergency is selected if an external emergency switch such as a foot activated type is used (not currently supported). The PA Broadcast selection is used with the Transit Bus PA system only, and Disabled is selected if neither is used.

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* This feature available only in 51xx models with Flash code Version 1.9.0 or later and 53xx models with ARM code 1.22.0 or later.

** This feature available only in 51xx models with Flash code Version 1.11.0 or later and 53xx models with ARM code 1.24 or later.

*** This feature available only with code Version 1.24.1/2.2.1/ 3.2.1 or later.

SECTION 5   RADIO WIDE SCREEN
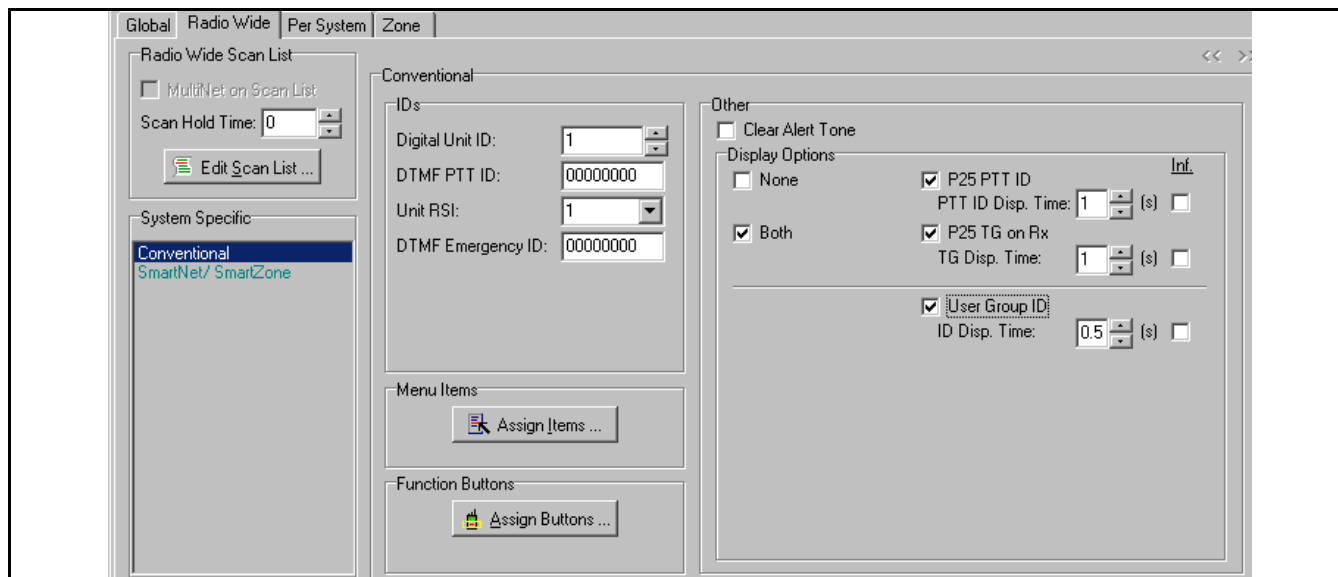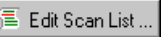
Figure 5-1   Radio Wide Conventional Screen
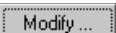
5.1 INTRODUCTION

The Radio Wide screen programs parameters that are the same for all Conventional, Project 25 Trunked, and SMARTNET/SmartZone systems (a different screen is displayed for each system type). These screens are shown in Figures 5-1, 5-3, and 5-4.

5.2 RADIO-WIDE SCAN LIST PROGRAMMING

NOTE: The radio-wide scan list cannot be programmed until all channels to be included in it have been set up in the Zone screens (see Section 6).

The Radio Wide scan list is the same for all system types and can include up to sixteen channels from any system. This scan list is programmed by clicking the [Edit Scan List ...] button on this screen or [icon] in the toolbar. The following Radio Wide Scan List screen is then displayed.

To select the channels that are in the radio wide scan list, click the [Modify ...] button to display the

Modify Scan List screen. Select the desired zones from the drop-down list and then check the channels to be included from each zone in the list.

Radio Wide Scan List Screen

Modify Scan List Screen
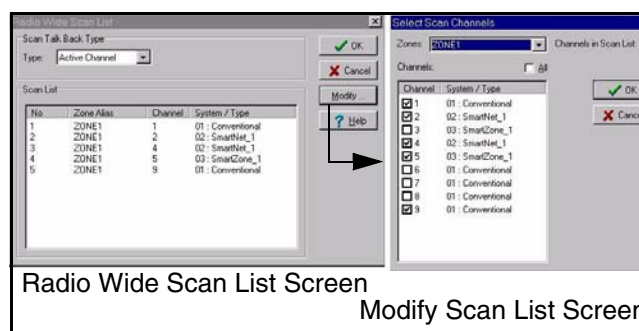
Radio-Wide Scan List Screens

Scan Talk Back Type

When a call is received while radio wide scanning, this determines if a response occurs on the Selected Channel or the channel of the call (Active Channel) when they are not the same.
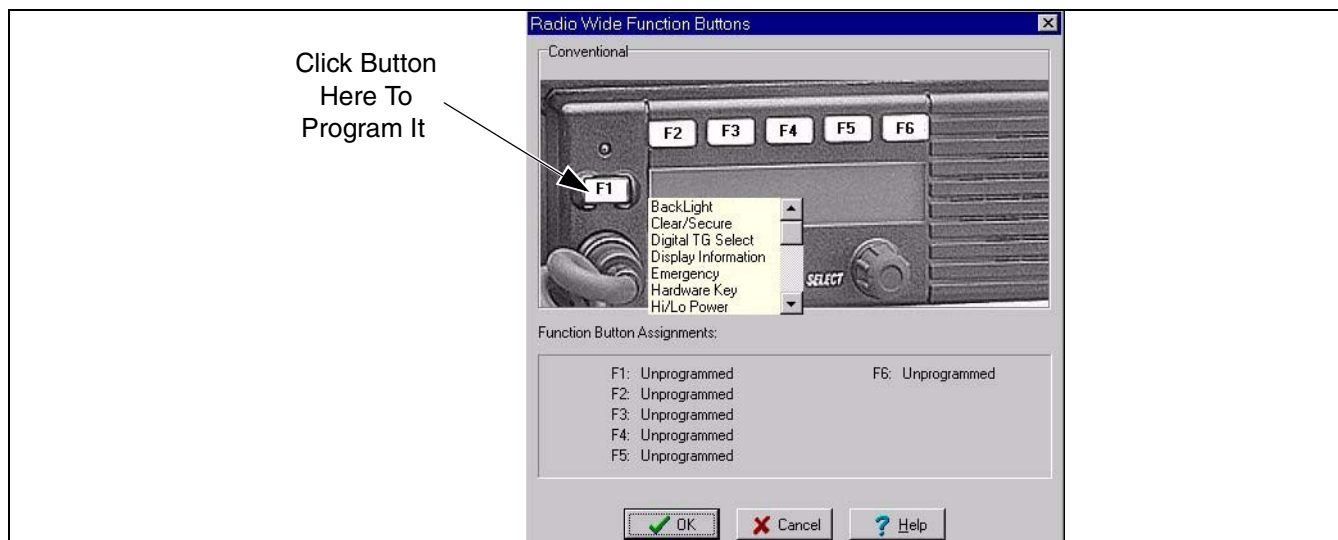
Figure 5-2 Assign Function Buttons Screen (53xx Series Shown)

Scan Hold Time

When Radio Wide scanning is occurring, this programs the delay that occurs after a message is no longer being received or transmitted before scanning resumes. Times of 0 - 7.5 seconds can be programmed.

5.3 MENU ITEMS PROGRAMMING (5100 ONLY)
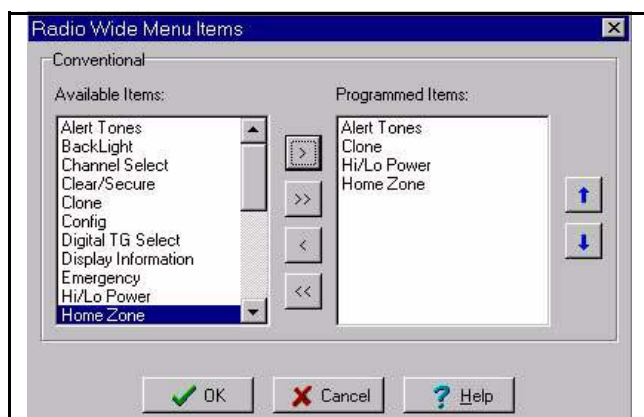
The menu function is available with 51xx portables only. The menu mode can be user selected if the "Menu Enable" box on the Global screen is checked. Clicking the ⬛ Assign Items ... button displays the preceding screen which is used to select the functions that are selectable in the menu mode. To move a function to the other list, double click it or select it and click one of the single arrow buttons. Clicking a double arrow button move all items to the other list.

A separate set of menu parameters can be programmed for each system type similar to the function buttons described in the next section. The system type being programmed is selected in the "System Specific" box of the Radio Wide screen. Functions can be controlled by both the menu and a function button if desired. The available 51xx menu functions are shown in Table 5-1.

5.4 FUNCTION BUTTON PROGRAMMING

Clicking ⬛ Assign Buttons ... in the Radio Wide screen displays a screen similar to the one shown in Figure 5-2 that programs the function buttons for the radio selected by Radio > Series.

Each button can be programmed with up to three different functions. One function can be programmed for Conventional systems, a second for SMARTNET/SmartZone systems, and a third for Project 25 Trunked systems. The system type is selected in the "System Specific" box of the Radio Wide screen. The available 51xx/53xx option button functions are shown in Table 5-1.

NOTE: To view the functions programmed for each button in the various modes, select Radio > View Programmed Radio Wide Functions (see Section 3.2).

Program the function buttons as follows:

1. Click the white "Fx" button being programmed in the photo and a drop-down list is displayed showing

Table 5-1   51xx/53xx Programmable Option Switch and 51xx Menu Mode Functions

Function	Available in Mode:				5100 Menu Display
	Conv.	**P25 Trk**	**SMARTNET**	**SmartZone**	
Alert tones On-Off	X	X	X	X	Tones
Backlight On-Off (51xx), Hi/Med/Off (53xx)	X	X	X	X	Backlight
Call Alert Select (Paging)	X	X	X	X	Call Alert
Call Response Select		X	X	X	Call Rsp
Change Keyset (OTAR)	X	X	X	X	Chg Keyset
Channel Select	X	X	X	X	Chan Selct
Clear/Secure Encryption Select	X	X	X	X	Security
Clone Programming Select (51xx menu only)	X	X	X	X	Clone
Configure (51xx menu only, not curr used)	X	X	X	X	Config
Digital (P25) Talk Group Select	X				Select TG
Display Information Select (freq or chan disp)	X				Display
Emergency Mode Select	X	X	X	X	Emergency
Erase Keys, OTAR (menu only w/51xx)	X	X	X	X	Erase Keys
External Public Address (53xx only)	X	X	X	X	-
High/Low Power Select	X	X	X	X	Tx Power
Home Zone Select	X	X	X	X	Home Zone
Horn Honk Select (53xx only)	X	X	X	X	-
Key Select, OTAR	X				Key Select
Keypad Lock Select (51xx only)	X	X	X	X	(Opt sw only)
Keypad Programming Select	X				Keypad Prg
Messaging Select	X		X	X	Message
Monitor Mode Select	X				Monitor
Normal/Selective Squelch Select	X				Squelch
OTAR Rekey Request	X				OTAR Rekey
P25 Packet Data	X				Data Modes
Phone Call Select			X	X	Phone
Priority Channel Select	X				Priority
Private Call Select			X	X	Priv Call
Radio Wide Scan Select	X	X	X	X	RW Scan
Remote Access (Pyramid Repeater) 53xx only	X	X	X	X	-
Repeater Talk-Around Select	X				Talk Arnd
RWS List Edit	X	X	X	X	RWS Edit
Scan Mode Select	X	X	X	X	Scan
Scan List Edit Select	X	X	X	X	Scan Edit
Scan List Select	X (5100 only)	X	X	X	Scan Selct
Set User Password	X	X	X	X	Set Paswd
Squelch (Code) Select List	X				Sqlch Code
Single Tone Encoder (51xx only)	X				Tone Encdr
Site Lock Select		X		X	Site Lock
Site Search Select		X		X	Site Srch
Status Select	X	X	X	X	Status
Surveillance Mode Select	X	X	X	X	Surv Mode
Tone Volume Edit	X	X	X	X	Tone Vol
Unit Call Select	X	X			Unit Call
Unprogrammed (not used)	X	X	X	X	-
Volume Down (51xx only)	X	X	X	X	(Opt sw only)
Volume Up (51xx only)	X	X	X	X	(Opt sw only)

NOTE: Several functions in this table are available only in radios with later versions of firmware .

the functions that can be assigned (with the 51xx portable, almost all buttons are programmable).

2. To select a function, double click it in the drop-down list. The functions that have been assigned to each button are displayed in the bottom part of the screen.

3. Repeat for all function buttons that are to be programmed. Then click OK to exit and save the changes or Cancel to exit without saving the changes. Then select the other system type if applicable and repeat this procedure.

5.5 RADIO WIDE CONVENTIONAL PARAMETERS

Clicking "Conventional" in the "System Specific" box displays the screen shown in Figure 5-1. This screen programs the functions that are the same for all Conventional systems. Refer to Section 5.6 for information on programming SMARTNET/SmartZone systems, and to Section 5.7 for information on programming Project 25 Trunked systems.

IDs

Digital Unit ID - When operating on a Project 25 (digital) channel, this number identifies the radio. Each radio must have a different ID, and it must be between 1 and 16,777,216.

DTMF PTT ID - The PTT ID is used on a channel programmed for pre- or post-transmit ANI. This ID consists of eight digits from 0-9. The ANI function is programmed on the channel screen described in Section 7.2 or 7.3.

Unit RSI - This sets the individual Radio Set Identifier of the radio that is used for OTAR (Over-the-Air Rekeying). Initially, it can be set to the Digital Unit ID only, but later changed by OTAR if desired.

DTMF Emergency ID - This sets the ANI number transmitted if the "Emergency ANI Call" and/or "Emergency Alarm" analog emergency features are selected on the conventional Per System screen (see Section 7.1).

Clear Alert Tone

If checked, a short beep sounds to indicate that the clear (non-encrypted) mode is selected. This tone sounds with SecureNet and digital OFB encryption only.

Display Options

These functions select if anything is displayed alternately with the selected channel alias or frequency when Project 25 group calls are received.

None - Only the selected channel alias or frequency is displayed.

Both (51xx/53xx only) - Both of the following are displayed.

P25 PTT ID (51xx/53xx only) - The ID of the mobile placing the call is displayed. The time this ID is displayed is programmable for 0.5-7.0 seconds* or infinite. When "infinite" is selected, this ID is displayed for the entire call and none of the other parameters are displayed.

P25 Talk Group on Rx (51xx/53xx only) - The alias of the talk group on which the call is being received is displayed. This can also be displayed for 0.5-7.0 seconds* or infinite as just described.

User Group ID (51xx/53xx only)** - If the ID of the call being received is included in a User Group ID list (see page 37), the alias of that group is displayed. This alias can also be displayed for 0.5-7.0 seconds or infinite as just described.

This feature available only in 51xx models with Flash code Version 1.9.0 or later and 53xx models with ARM code 1.22.0 or later.

**This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.*
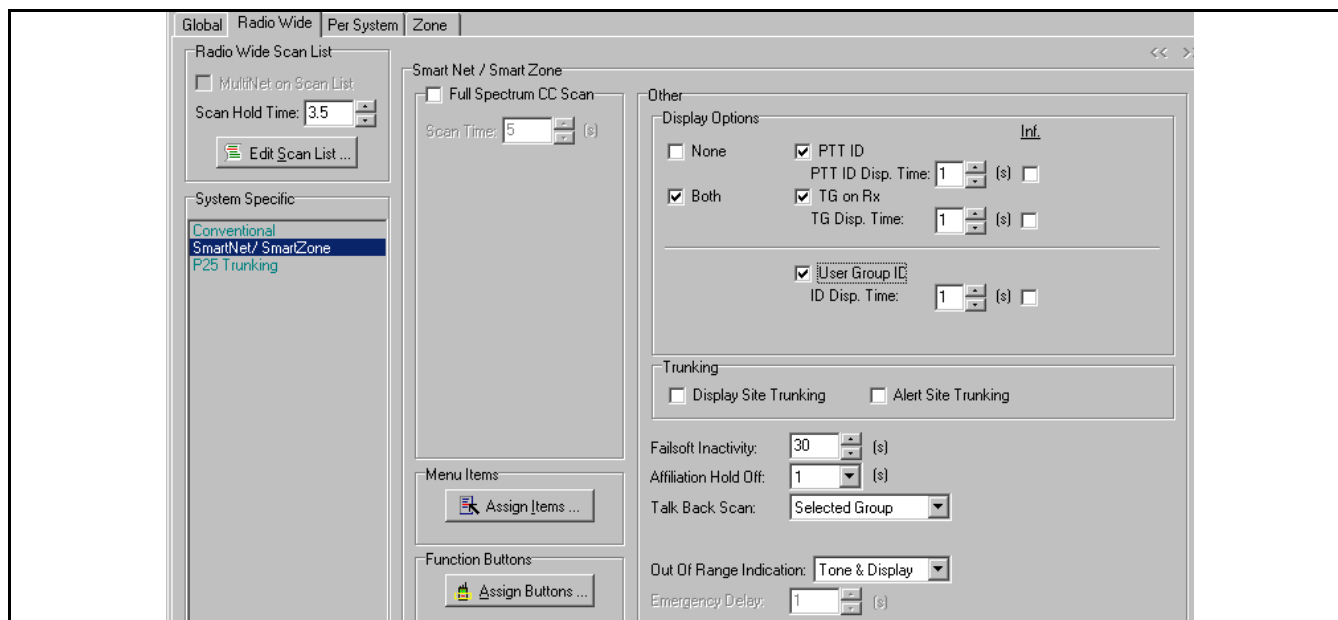
Figure 5-3   Radio Wide SMARTNET/SmartZone Screen

5.6 RADIO WIDE SMARTNET/SMARTZONE PARAMETERS

Clicking "SmartNet/SmartZone" in the "System Specific" box (if applicable) displays the screen shown in Figure 5-3. This screen programs the functions that are the same for all SMARTNET and SmartZone systems. Refer to Section 5.5 for information on programming Conventional systems, and to Section 5.7 for information on programming Project 25 Trunked systems.

Full Spectrum CC Scan

If all potential control channel frequencies have been searched, the radio enters a channel-by-channel search across the full spectrum the radio covers. The timer sets the length of time this scan is performed before checking the expected frequencies again. After these frequencies are checked, full spectrum scanning resumes. This cycle repeats until a control channel is found.

Full Spectrum CC Scan - Checking the box enables full spectrum scan.

Scan Time - Sets the time that full spectrum scanning occurs as just described. The selectable range is 5-31 seconds and the default is 5 seconds.

Display Options - Same as conventional P25 display options described on page 27. The "Both" selection is not available with the 7780/9883.

Trunking

Display Site Trunking - If this is selected, "Display Site Trunking" is displayed if the affiliated site loses communication with the zone controller and is operating in the "Site Trunking" mode.

Alert Site Trunking - If this is selected, an alert tone sounds and "Site Trunking" is displayed if the affiliated site loses communication with the zone controller and is operating in the "Site Trunking" mode.

Failsoft Inactivity - Programs failsoft operation. If the radio remains inactive (no receive or transmit activity on channel) while operating in the failsoft mode for the programmed time, the radio momentarily leaves the failsoft mode and attempts to find a control channel. If "0" is programmed, the radio does not leave the failsoft mode.

Affiliation Hold Off - With SmartZone operation, this is the delay time that occurs after acquiring the control channel before it sends an affiliation ISW. This prevents all radios on the system from sending affiliation ISWs at the same time.

Figure 5-4   Radio Wide Project 25 Trunking Screen

Talkback Scan - When a call is received while scanning, this determines if a response made before scanning resumes occurs on the Selected talk group or the talk group of the call (Active) when they are not the same. The Scan Hold Time is programmed on the Per System screen.

Out-of-Range Indication - Selects if the periodic tone sounds, "Out of Rng" (or "NO SYS") is displayed, or if both or neither of these indications occur when an out-of-range condition exists.

5.7 RADIO WIDE PROJECT 25 TRUNKED SYSTEM PARAMETERS

Clicking "Project 25 Trunked" in the "System Specific" box displays the screen shown in Figure 5-4. This screen programs the functions that are the same for all Project 25 trunked systems. Refer to Section 5.5 for information on programming Conventional systems, and to Section 5.6 for information on programming SMARTNET/SmartZone systems.

RSSI Threshold

This sets the RSSI (Receive Signal Strength Indicator) levels which determine when searching for and switching to another site occurs. Clicking the "Restore Defaults" button restores these levels to the default setting. If the "Hex" box is checked, the RSSI levels are displayed in the hexadecimal instead of decimal notation.

NOTE: The default RSSI levels should not be changed unless you are familiar with how this levels affect radio operation.

Full Spectrum CC Scan

If all potential control channel frequencies have been searched, the radio enters a channel-by-channel search across the full spectrum the radio covers. The timer sets the length of time this scan is performed before checking the expected frequencies again. After these frequencies are checked, full spectrum scanning

resumes. This cycle repeats until a control channel is found.

Full Spectrum CC Scan - Checking the box enables full spectrum scan.

Scan Time - Sets the time that full spectrum scanning occurs as just described. The selectable range is 5-31 seconds with a default of 5 seconds.

Failsoft

Programs failsoft operation which occurs when there is a controller or other major system failure.

Failsoft Inactivity Duration - Sets the time the radio must remain inactive (no receive or transmit activity on channel) in the failsoft mode for it to momentarily leave the failsoft mode and attempt to find a control channel. If "0" is programmed, the radio does not leave the failsoft mode.

Emergency Blocked - If this is checked, emergency calls are disabled when in the failsoft mode.

Ring Time

Individual Call Maximum Target Ring - Sets the maximum ring time of the target mobile when receiving phone and unit-to-unit calls. When this time expires, the call is automatically discontinued. Times of 61-120 seconds can be programmed with 61 seconds the default.

Private Call Maximum Int Ring - Sets the maximum time the initiating mobile rings when placing a unit call (phone calls not included). Ringing stops if the target mobile answers before this timer expires. Times of 1-255 seconds or infinite can be programmed with 30 seconds the default. If infinite is programmed, ringing occurs until the target mobile answers.

Hold Off Time

Radio Random Hold Off Time - When a failure occurs on a site, this sets the delay that occurs before a mobile leaves that site and registers on another. It also sets the delay that occurs before a mobile returns to a site that has returned to normal operation. A random time is calculated between 0 and the selected time. This timer starts only when the following Holdoff delay timer expires. Times of 0-60 minutes can be programmed with 10 minutes the default.

Holdoff Delay - Sets the delay in registration or affiliation that occurs before starting the preceding random hold off time. During this delay, monitoring for over-the-air packets occurs. Times of 5-60 seconds can be programmed with a default of 5 seconds.

Trunking

Display Site Trunking - If this is selected, "Site Trunking" is displayed if the affiliated site loses communication with the zone controller and is operating in the site trunking mode. This message is displayed until the zone controller returns to normal operation.

Alert Site Trunking - If this is selected, an alert tone sounds when entering the site trunking mode just described.

Other

Display Options - Same as conventional P25 display options described on page 27.

Talkback Scan - When a call is received while scanning, this determines if a response occurs on the Selected talk group or the talk group of the call (Active Group) when they are not the same. The Scan Hold Time is programmed on the Per System screen.

Out-of-Range Indication - Selects if the periodic tone sounds, "Out of Rng" (or "NO SYS") is displayed, or if both or neither of these indications occur when an out-of-range condition exists.

SECTION 6   SETTING UP ZONES AND CHANNELS
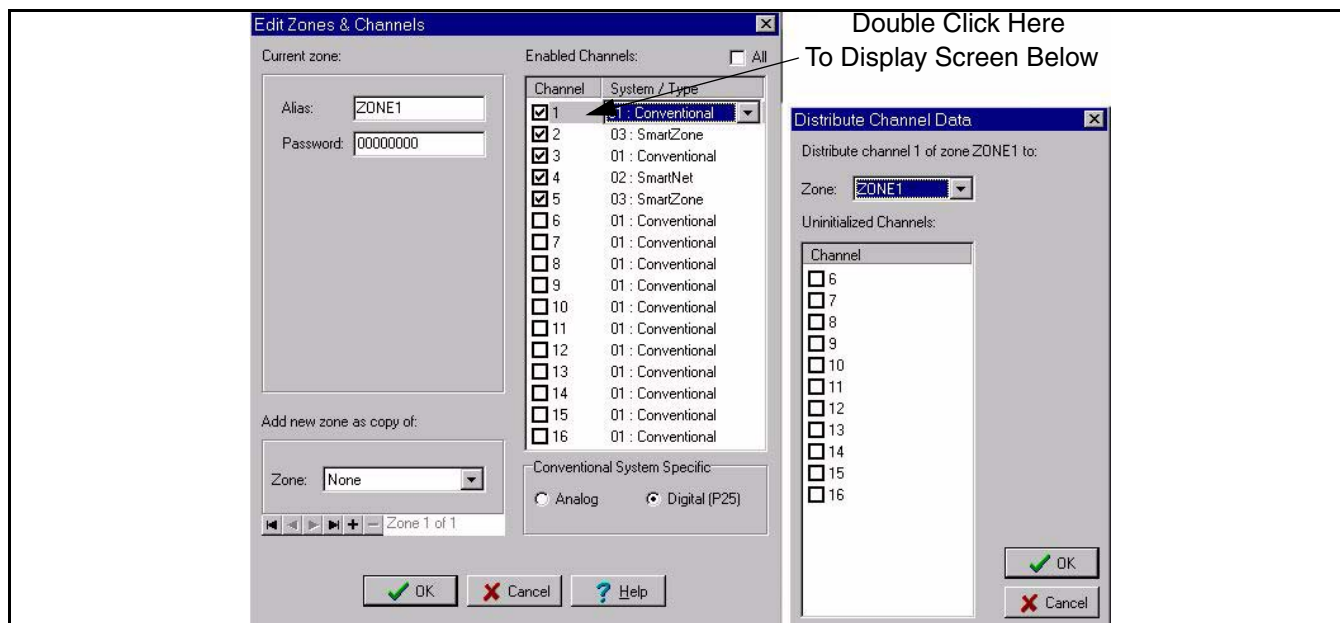
Figure 6-1   Edit Zones and Channels Screen

6.1 INTRODUCTION

The following information describes how to set up zones and assign channels to each zone. A zone can include up to 16 channels of any type (conventional analog, Project 25 conventional, SMARTNET/Smart-Zone, or Project 25 Trunked).

With all radios except the 51xx portable, up to 16 zones can be programmed for up to 256 channels. With the 51xx portable, up to 32 zones for up to 512 channels can be programmed if the "512 Talkgroups/ Channels" option is enabled (see page 13). Otherwise, up to 16 zones can be programmed.

6.2 SETTING UP ZONES

1. Select the Zone screen (see Figure 7-2). Then click
   ![Edit Zone ...] to display the Edit Zones and Chan-nels screen shown in Figure 6-1. Alternatively, click
   ![icon] in the toolbar.

2. To add a new blank zone, select "None" in the Zone drop-down list and then click the ![+] button. To make a copy of a current zone, select the desired zone in the Zone drop-down list instead. To delete the current zone, click the ![−] button.

3. To display the first zone, click ![◄◄], the last zone ![►►]; the previous zone ![◄] ; and the next zone, ![►].

4. Program the alias (identification) that is briefly displayed when the zone is selected by entering up to 10 characters in the Alias box.

5. With 53xx mobiles and 51xx portables, a Zone Password can be programmed which must be entered to perform keypad programming of the zone (see Section 11.1). If this password is desired, enter any eight numbers from 0-9. If no password is desired for the zone, simply leave this field all zeros.
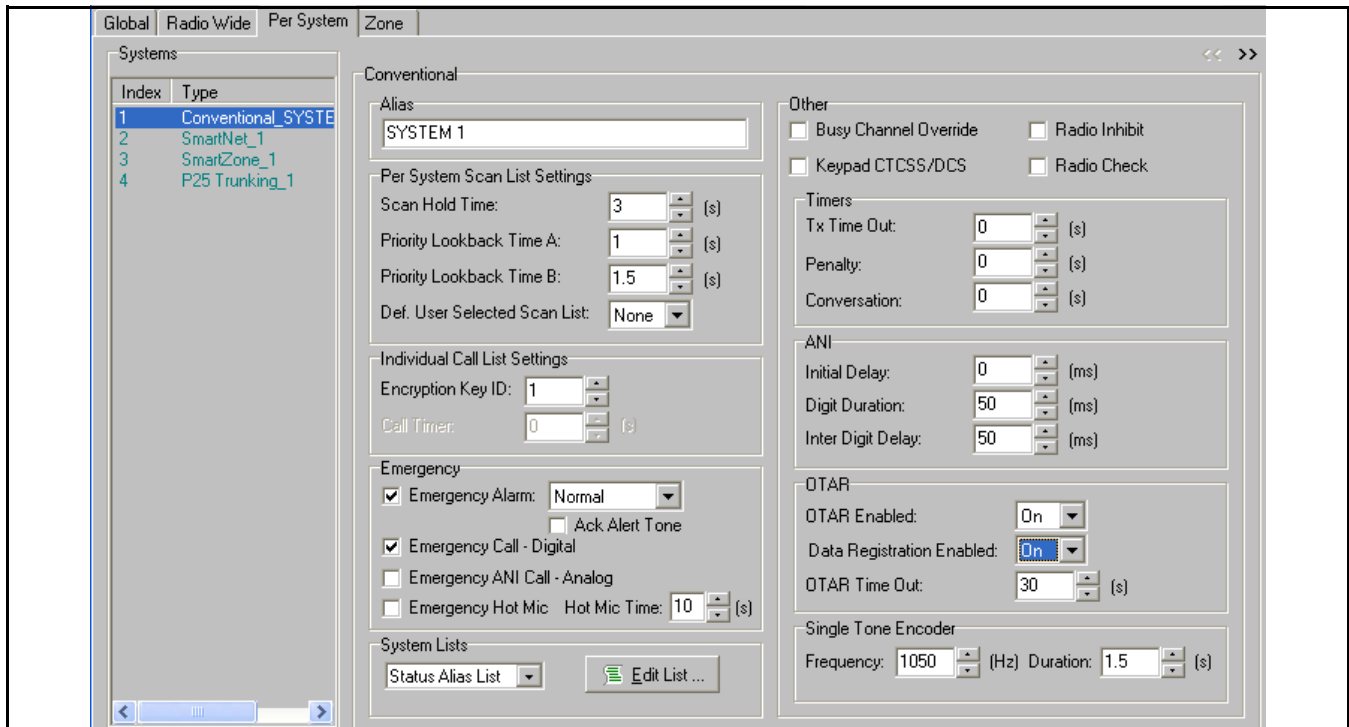
6.3 SETTING UP CHANNELS

NOTE: When channels are assigned to zones, the system of the channel is also selected. Therefore, before assigning channels to zones, all necessary systems must be set up as described in Section 1.10.

Channels are set up by assigning them to a zone in the Edit Zones and Channels screen shown in Figure 6-1. Proceed as follows to set up any type of channel (Conventional Analog, Conventional Digital, Project 25 Trunked, SMARTNET/SmartZone).

1. If necessary, select the Zone screen (see Figure 7-2) and then click [Edit Zone ...] to display the Edit Zones and Channels screen shown in Figure 6-1. Alternatively, click [ ] in the toolbar.

2. Select the desired zone as described in the preceding section.

3. To add a channel to the displayed zone, check the applicable box in the "Channel" column. To select or de-select all channels in the box, check or uncheck the "All" box.

4. To assign the channel to a system (if applicable), select the drop-down list in the "System/Type" column and select the desired system.

5. For Conventional channels, also select the channel type of each channel by clicking Analog or Digital (P25) in the "Conventional System Specific" box.

6. To copy an enabled channel to unprogrammed channels of the current zone or other zones, double click the shaded area of the channel as shown in Figure 6-1. The "Distribute Channel Data" screen is then displayed to select the desired channels.

7. Repeat the preceding steps until the desired channels are set up in each zone.

8. To program individual system and channel information, refer to Section 7 (Conventional), Section 8 (SMARTNET/SmartZone), or Section 9 (Project 25 Trunked).

SECTION 7   CONVENTIONAL SYSTEMS AND CHANNELS

Figure 7-1   Individual Conventional System Screen

7.1 INDIVIDUAL CONVENTIONAL SYSTEM PARAMETERS

Individual system parameters are programmed by the "Per System" screen shown in Figure 7-1. These

parameters can be programmed after the desired systems have been set up as described in Section 1.10.

There are also radio wide parameters that are programmed by the Radio Wide screen as described in

Section 5.5. For information on programming individual SMARTNET/SmartZone and Project 25 Trunked system parameters, refer to Sections 8.1 and 9.1. The parameters in the individual Conventional System screen are as follows:

Per System Scan Lists Settings

These parameters set various timers that control standard scanning when a channel assigned to the system is selected.

Scan Hold Time - Sets the delay that occurs before scanning resumes after a signal is no longer received. Times of 0 -7.5 seconds can be programmed.

Priority Lookback Time A - This time determines how often the priority channel is checked for activity. Times of 0.25-4.00 seconds in 0.25-second steps can be programmed.

Priority Lookback Time B - This time determines how often the priority channel is checked once an incorrect Call Guard (CTCSS/DCS) or NAC code is detected. Since it takes much longer to detect an incorrect Call Guard signal than a carrier, this time should be relatively long to prevent the interruptions from making a message difficult to understand. Times of 0.5-8.0 seconds can be programmed in 0.5-second steps.

Default User Selected Scan List - Selects the scan list that is always selected on power up. A different scan list can be temporarily selected using the Scan List option switch or menu parameter (if applicable).

Individual (Unit) Call List Settings (P25 Only)

Encryption Key ID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure individual calls on the system if applicable.

Call Timer - Used with 5300, Rev 4, logic board only to set the maximum time the radio remains in the individual call mode after an individual call is received. A response must be made before this timer expires. With Rev 6 and later boards and other radios, the call is ended by pressing the Call button.

Emergency (Conventional)*

Emergency Alarm - If this box is checked, emergency alarms are sent by pressing the Emergency option switch. In the P25 mode, an emergency alarm is a special P25 data transmission. In the analog mode, it is a DTMF Emergency ID that is sent. This ID is programmed on the Conventional Radio Wide screen described in Section 5.5.

Normal/Silent - When "Normal" is selected and an emergency alarm is sent, the red transmit indicator lights, an emergency tone sounds, and EMERGNCY flashes in the display. EMERGNCY continues to flash until power is cycled, the channel is changed, or the Emergency switch is pressed and held. If "Silent" is programmed, none of these indications occur.

Acknowledge Alert Tone - If selected, an alert tone sounds when the emergency alarm is acknowledged by the dispatcher.

Emergency Call - Digital - Enables Emergency Calls on conventional P25 channels. When the Emergency button and then the PTT switch are pressed, an emergency call is transmitted. To exit the emergency mode, change the channel, cycle power, or press and hold** the Emergency switch.

Emergency ANI Call - Analog - Enables Emergency Calls on conventional analog channels. When the Emergency button and then the PTT switch are pressed, the Emergency DTMF ID is sent every transmission (in place of the DTMF PTT ID if applicable). To exit the emergency mode, change the channel, cycle power, or press and hold** the Emergency switch.

Emergency Hot Mic - When this box is checked and an emergency alarm is sent by pressing the Emergency switch, automatic transmitting occurs with the microphone audio unmuted (without user intervention) for the time specified by the following Emergency Hot Mic Time. If it is not checked or if an emergency call is not selected, automatic transmissions do not occur. This feature is initiated only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. To reset this function, the channel must be changed or power cycled.

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* This feature available only in 51xx models with Flash code Version 1.8.0 or later and 53xx models with ARM code 1.21.0 or later.

** This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

Emergency Hot Mic Time - Defines the period during which automatic transmissions occur. Times of 10-120 seconds in 10-second steps can be selected.

System Lists

The various conventional system lists are programmed by selecting them in the System Lists drop-down list shown above and then clicking the Edit List button. Descriptions of the various lists and the information they program follow.

Status Alias List (P25 Only)*

The Status Alias List screen shown above programs the alias for each of up to eight status conditions that can be sent. The meaning of each status number is defined by the system manager.

To display this screen, on the Conventional Per System screen, select Status Alias List in the drop-down list and then click the Edit List ... button (see Figure 8-1).

To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to 10 characters can be entered that identify the status. This identification is displayed when the user selects a status condition.

This feature available only in 51xx models with Flash code Version 1.8.0 or later and 53xx models with ARM code 1.21.0 or later. 34

Message Alias List (P25 Only)*

The Message Alias List screen shown below associates an alias (name) with each message number. The meaning of each message number is defined by the system manager.

To display this screen, on the Conventional Per System screen, select Message Alias List in the drop-down list and then click the Edit List ... button (see Figure 8-1).
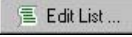
To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to 10 characters can be entered that identify the status. This identification is displayed when the user selects a message.

Call List (P25 Only)
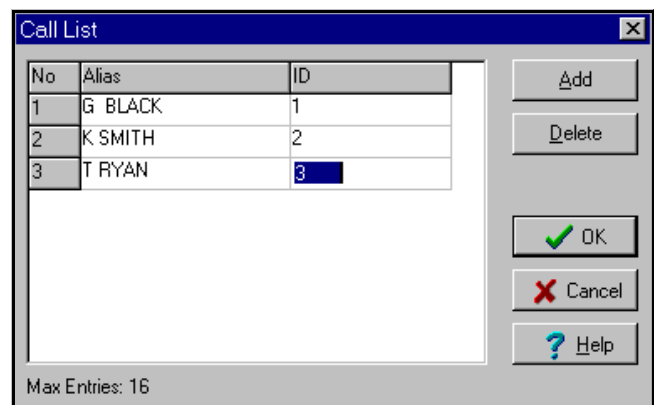
This Call List screen shown above sets up the IDs used to place individual calls on conventional digital (Project 25) channels. This list is not used with conventional analog channels.

To display this screen, on the Conventional Per System screen, select Call List in the drop-down list and then click the ☰ Edit List ... button (see Figure 8-1).

To add a call, click the Add button, and to delete an call, simply select it and click the Delete button. To edit an Alias or ID, select it and enter the desired information as follows:

Alias - Up to ten characters can be entered to identify the user being called. This identification and the ID are alternately displayed when the call is selected by the user. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the ID of the radio being called. Valid entries are 0 - 16,777,216.

Talk Group List (P25 Only)

The Talk Group screen shown above sets up the Talk Groups used to place group calls on conventional digital (Project 25) channels. Talk groups are not used with conventional analog channels. Talk groups are assigned to channels on the channel programming screen described in Section 7.3.

To display this screen, on the Conventional Per System screen, select Talk Group List in the drop-down list and then click the ☰ Edit List ... button (see Figure 8-1).

To add a talk group, click the Add button, and to delete an talk group, simply select it and click the Delete button.

To add an entire block of talk group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The following screen is then displayed:

Add Mode Drop Down List - "Single" adds the next available ID similar to the preceding "Add" button. "Multiple" adds a block of IDs as follows. To initiate the selected add operation, click the preceding "Add" button. If the specified ID range results in duplicate IDs, an error message is displayed and no IDs are added.

Start ID - Specifies the starting ID of the block.
ID Count - Specifies the number of IDs to be added.
ID Step - Specifies if consecutive IDs are added or some other step rate is used.

For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

To edit an ID or Alias, select it and enter the desired information as follows:

Alias - The alias is the identification that is displayed when the Talk Group is selected, and up to 10 characters can be entered. This drop-down list selects the Talk Group to be edited if applicable.

Group ID - Group IDs can be any number from 1-65535. Group IDs can be entered as decimal or hexadecimal numbers (if "Hex ID" is checked).

Strapping Mode

Clear - All transmissions on the group occur in the clear (unscrambled) mode.

Secure - All transmissions occur in the secure (scrambled) mode.

| Edit Scan List Screen | Modify Scan List Screen |
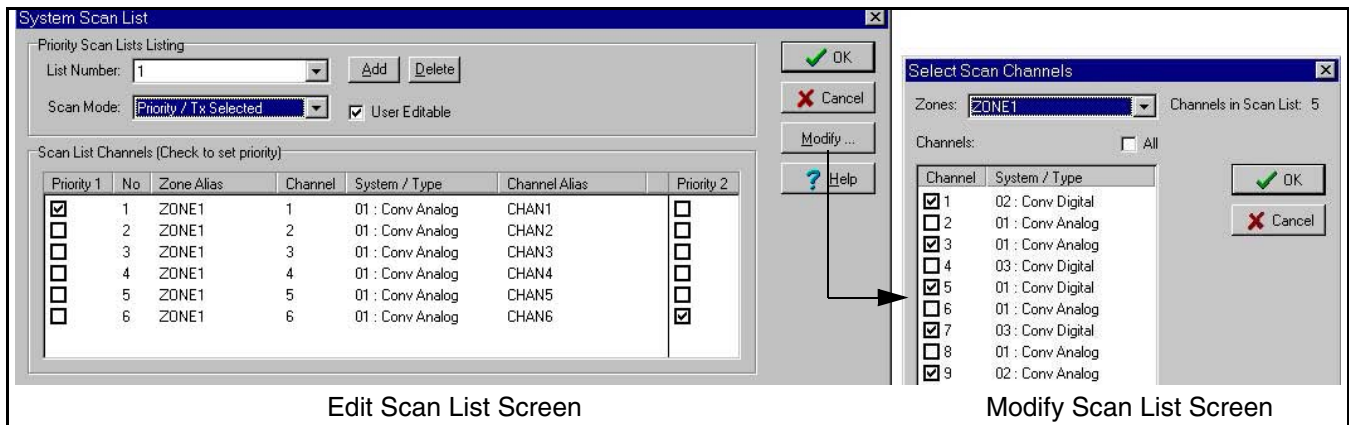
Standard Scan List Programming Screens

Switched - The clear or secure status of the group is selected by the Clear/Secure option switch.

Encryption Key ID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Priority Scan List

NOTE: It may be necessary to define specific channel parameters before programming the conventional scan lists as follows (see Sections 7.2 and 7.3).

Clicking the [Edit Scan List ...] button displays the preceding screen which programs the standard scan lists that are selected on the system.

List Number - This drop-down list selects which of the scan lists to program. Click the "Add" button to add a scan list and "Delete" to delete a scan list.

User Editable - If this box is checked, user editing of the scan list is allowed. The Scan Edit function switch is then required. User editing can be enabled or disabled on each scan list.

NOTE: With the 51xx and 53xx, Priority 1 and 2 channels can be programmed. The Priority 1 channel is sampled while listening to a call on the Priority 2 channel but not vice versa. Priority sampling does not occur while listening to any type of digital call.

Scan Mode - Sets the channel on which transmissions occur when the PTT switch is pressed while scanning. A different mode can be programmed for

each scan list. In addition, it selects if priority sampling is used and also the type of priority channel. The following modes are available:

No Priority - Priority sampling does not occur (all channels are scanned in sequence). The radio transmits on the selected channel.

Priority/Tx Selected - Priority sampling occurs and the priority channel(s) are those programmed in the selected scan list. The radio transmits on the selected channel.

Priority/Tx Priority (1) - Priority sampling occurs and the priority channel(s) are programmed in the selected scan list. The radio transmits on the priority (1) channel.

Priority (1) on Sel Chan - The priority (1) channel is always the selected channel. The radio transmits on the selected channel.

Talkback - No priority sampling occurs. The radio transmits on the channel of a call while scanning is halted. Then when scanning resumes, it transmits on the selected channel.

If the "Priority/Tx Priority" or "Priority/Tx Selected" mode is programmed, the priority channel must then be chosen for the scan list. To do this, click the box next to the desired channel.

Select the Priority 1 channel in the Priority 1 column and if a Priority 2 channel is also used, select it in the Priority 2 column.

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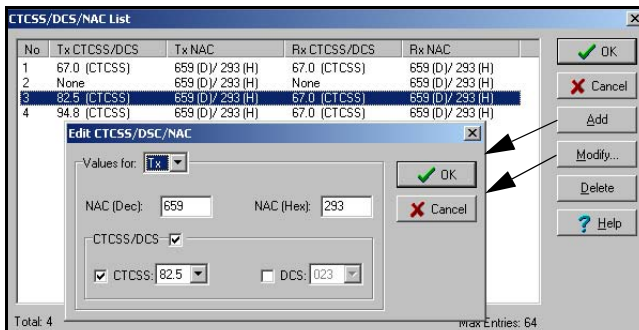
Modify (**Modify**) **-** To add or delete channels from a list, click this button to display the Modify Scan List screen shown in the preceding illustration. Select the channels from each zone that are to be included in the selected list (up to 16 channels maximum).

OK **- (OK) -** Clicking this button closes the screen and saves the changes.

Cancel (**Cancel**) **-** Clicking this button closes the screen without saving any changes.

CTCSS/DCS/NAC List

This displays the following screen that programs the list of CTCSS/DCS (Call Guard) and NAC (P25) codes that can be selected if the Selective Squelch option switch is programmed or the Keypad CTCSS/DCS function which follows is programmed.
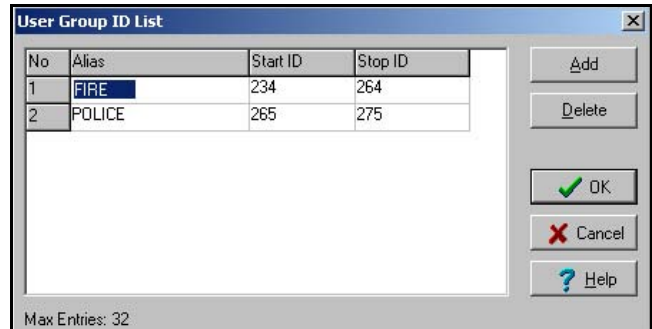
To add a code to the list, click the Add button and an additional screen like the one shown above is displayed. Different codes can be programmed for the transmit and receive modes by selecting the mode in the drop down list. In addition, carrier squelch can be programmed instead of a CTCSS/DCS code by unchecking the CTCSS/DCS box. To change a code, select it and then click the Modify button. Up to 64 different codes can be programmed. A CTCSS/DCS code table is shown on page 79.

User Group ID List**

This User Group ID List screen which follows programs aliases that can be displayed if a call is received on a talk group ID within the programmed block. For example, with the following screen, if a group call is received on group IDs 234-264, the alias "Fire" can be displayed. The display of this alias is

controlled by the "User Group ID" parameter on the Radio Wide screen.

Other

Busy Channel Override - If selected, the busy channel lockout feature can be overridden by quickly releasing and then pressing the PTT switch.

Keypad CTCSS/DCS- If selected, a code for the selected channel can be directly selected from the programmed CTCSS/DCS/NAC list using the keypad. For example, pressing the "3" key selects code number 3 from the table. No other functions can then be assigned to the keys. If this is not selected, these codes can be selected only by the option button or menu parameter for that function.

Radio Inhibit (P25 only)* - If selected, the dispatcher can send a command which disables the radio.

Radio Check (P25 only) * - If selected, the dispatcher can send a message requesting a response from the radio (to check if it is in operation, for example).

Timers

Tx Time-Out - This timer limits the length of individual transmissions. Times up to 3 minutes, 45 seconds can be programmed in 15-second steps.

Penalty - This timer disables transmitting after the time-out timer disables the transmitter. Times up to 3 minutes, 45 seconds can be programmed in 15-second steps.

Conversation - This timer limits the total length of a conversation. Times up to 7.5 minutes can be programmed in 0.5-minute steps.

* This feature available only in 51xx models with Flash code Version 1.8.0 or later and 53xx models with ARM code 1.21.0 or later.

** This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

ANI

NOTE: The eight-digit DTMF PTT ID is programmed on the Radio Wide Conventional screen, and pre and post ANI is enabled on the analog channel screen.

Initial Delay - Sets the delay before ANI is sent for 0-620 ms.

Digit Duration - Sets the duration of each digit for 50-800 ms in 50 ms steps.

Inter Digit Delay - Sets the delay between digits for 50-800 ms in 50 ms steps.

OTAR

NOTE: The SLN (CKR) key management mode must be selected on the global screen to select the OTAR-related parameters which follow.

OTAR Enabled - Select "On" to enable OTAR (Over-the-Air Rekeying) of encryption keys. Select "Off" to disable this feature.

Data Registration Enabled - Select "On" if OTAR is used. The radio then registers with the data system on a channel change (P25 channels only)

OTAR Time Out* - When rekeying is initiated by the radio (OTAR Rekey Request message sent), this setting determines how long the radio waits for a response from the Key Management Facility (KMF). Times of 20-180 seconds can be programmed.

Single Tone Encoder (51xx Only)

NOTE: This feature is available only with 51xx radios that have Flash code Version 1.8.0. or later.

This programs the single tone encoder frequency and tone duration. This feature is available if the Single Tone option button or menu parameter is programmed. Tone frequencies of 500-2500 Hz at a duration of 0.5-2.5 seconds can be programmed.

Conventional System Page 2 Screen Description

An additional conventional system screen is opened/closed by clicking the ⟨⟨ ⟩⟩ buttons in the upper right corner of the screen. The following additional parameters are then displayed:
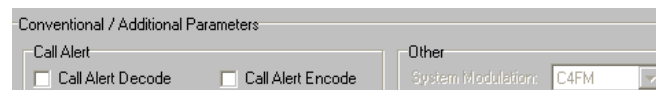
Call Alert (P25 Only)**

Call Alert Decode - If selected, enables call alert messages (pages) to be received.

Call Alert Encode - If selected, enables call alert messages (pages) to be sent.

* This feature available only in 51xx/53xx models with Flash code 2.x or 3.x (see Section 16).

** This feature available only in 51xx models with Flash code Version 1.8.0 or later and 53xx models with ARM code 1.21.0 or later.

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Figure 7-2   Conventional Analog Channel Screen

7.2 CONVENTIONAL ANALOG CHANNEL PARAMETERS

After the desired channels have been set up as described in Section 6.3, individual channel parameters can be programmed. Select the Zone screen shown in Figure 7-2 and then select the desired Zone using the drop-down list in the "Zones" box. Screens which program individual channel parameters are selected by clicking the channel in the "Channels" box.

The parameters displayed when a Conventional Analog channel is selected are as follows. Refer to Section 7.3 for information on Conventional Digital (P25) channels. SMARTNET/SmartZone and Project 25 Trunked channels are described in Sections 8 and 9.

Channel Type

Indicates the type of channel (Conventional Analog or Conventional Digital) that is currently selected in the "Channels" box.

Channel Alias

Programs the alias (identification) that is displayed when the channel is selected.

Transmit

Power - Fixes the transmit power on the channel for the high or low level or makes it selectable (the high/ low power option switch is then required).

Time Out - Enables or disables the transmit time-out timer on the channel. The time-out timer time is programmed on the Per System programming screen (see Section 7.1).

Modulation Level - This selects if the channel modulation is wideband (5 kHz), narrowband (2.5 kHz), or NPSPAC (4 kHz). NPSPAC (public safety) modulation applies to 800 MHz models only.

Frequency - Programs the transmit frequency of the channel.

Disabled - Checking this box disables transmitting on the channel so that it is receive only.

CTCSS/DCS - Checking this box enables Call Guard (CTCSS/DCS) squelch control transmission on the channel. If this box is not checked, no code is transmitted and squelch is carrier controlled.

CTCSS - If this box is checked, tone Call Guard (CTCSS) squelch control is used and the desired tone is selected by the drop-down list. *NOTE: A CTCSS/ DCS code table is shown on page 79.*

DCS - If this box is checked, digital Call Guard (DCS) squelch control is used and the desired code is selected by the drop-down list.

Receive

Frequency - Programs the receive frequency of the channel.

CTCSS/DCS - Checking this box enables Call Guard (CTCSS/DCS) squelch control on the channel. If this box is not checked, no squelch control coding is used, and squelch is carrier controlled.

CTCSS - If this box is checked, tone Call Guard (CTCSS) squelch control is used and the desired tone is selected by the drop-down list.

DCS - If this box is checked, digital Call Guard (DCS) squelch control is used and the desired code is selected by the drop-down list.

Security

NOTE: Voice encryption is an optional feature that requires factory programming and possibly special hardware.

Strapping Mode

Strapped Clear - All transmissions on the channel occur in the clear (unscrambled) mode.

Strapped Secure - All transmissions occur in the secure (scrambled) mode selected by Security Type.

Switched - The clear or secure status of the channel is selected by the Clear/Secure function switch.

Security Type

Securenet - Selects Motorola SecureNet™ DES type secure communication when either the Strapped Secure or Switched strapping modes are selected.

Scrambling - Selects Transcrypt 460 scrambling when either the Strapped Secure or Switched strapping modes are selected (not available with 5100 and later 5300 models).

Scrambling Type

When the Transcrypt 460 scrambling type is selected, 460 scrambling is always enabled.

Tx DES/DES-XL

When the Motorola SecureNet secure communication is selected, enables either the DES or DES-XL type (with the 51xx, DES-XL is available only in later models equipped with the UCM module).

Key PID

Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the channel if applicable.

Rx Auto Detect

With the SecureNet protocol, selecting "Secure" enables automatic detection of encrypted receive signals (not available with 5100 models). This may increase the response time of the radio to an incoming signal. Selecting "Proper Key" causes the radio to search the available SecureNet keys until it finds a match for the current transmission.

Other

Busy Channel Lockout

Off - Disables this feature.

Noise - Transmitting is disabled if a carrier is detected.

Tone - Transmitting is disabled if an incorrect Call Guard (CTCSS/DCS) tone or code is detected (one not programmed for current channel).

Keypad DTMF

If this box is checked, manual dialing of numbers using the DTMF keypad is allowed.

Figure 7-3   Conventional Digital (P25) Channel Screen

ANI

This drop-down list selects Pre Tx or Post Tx ANI. If "Pre Tx" is selected, a DTMF-coded ID is sent at the beginning of each transmission. If "Post Tx" is selected, a DTMF coded ID is sent at the end of each transmission. This ID is set in the Radio Wide Conventional screen by "DTMF PTT ID" (see Section 5.5), and ANI timing is set in the Per System Conventional screen (see Section 7.1).

7.3 CONVENTIONAL DIGITAL (P25) CHANNEL PARAMETERS

After the desired channels have been set up as described in Section 6.3, individual channel parameters can be programmed. Select the Zone screen shown in Figure 7-3 and then select the desired Zone using the drop-down list in the "Zones" box. Screens which program individual channel parameters are selected by clicking the channel in the "Channels" box.

The parameters displayed when a Conventional Digital channel is selected are as follows. Refer to Section 7.2 for information on Conventional Analog channels. SMARTNET/SmartZone and Project 25 Trunked channels are described in Sections 8 and 9.

Channel Type

Indicates the type of channel (Conventional Analog or Conventional Digital) that is currently selected in the "Channels" box.

Channel Alias

Programs the alias (identification) that is displayed when the channel is selected. Up to ten characters can be programmed.

Mixed Mode

Mixed analog and digital (Project 25) operation can be programmed on a channel. With mixed mode operation, both types of calls can be received, and the Tx Type determines if NAC or CTCSS/DCS is transmitted. With analog operation, channel modulation, coded squelch, and ANI signaling may require programming similar to that described in Section 7.2.

Enable - Checking this box selects both analog and digital operation on the current channel.

Tx Type - When "Analog" is selected, CTCSS/DCS is transmitted, and when "Digital" is selected, NAC is transmitted.

Transmit

Power - Fixes the transmit power on the channel for the high or low level or makes it selectable (the high/low power function switch is then required).

Time Out - Enables or disables the transmit time-out timer on the channel. The time-out timer time is programmed on the Per System programming screen (see Section 7.1).

Modulation Level - If the Mixed Mode and Tx Type = Analog is selected, the modulation level is programmed. This selects if the channel modulation is wideband (5 kHz), narrowband (2.5 kHz), or NPSPAC (4 kHz).

Frequency - Programs the transmit frequency of the channel.

Disabled - Checking this box disables transmitting on the channel so that it is receive only.

NAC - Programs the transmit NAC (Network Access Code). These codes can be 0-4095, and either decimal or hexadecimal numbers can be entered.

CTCSS/DCS - If the Mixed Mode and Tx Type = Analog is selected, the transmit Call Guard (CTCSS/DCS) squelch coding can be programmed (see Section 7.2).

Receive

Frequency - Programs the receive frequency of the channel.

NAC - Programs the receive NAC (Network Access Code). These codes can be 0-4095, and either decimal or hexadecimal numbers can be entered.

Digital Squelch - When checked, carrier squelch is enabled which results in all digital traffic, regardless of NAC or talk group ID, being received. This does not program NAC F7E which is now used the same as other NAC codes.

CTCSS/DCS - If the Mixed Mode is selected, the receive Call Guard (CTCSS/DCS) squelch coding can be programmed (see Section 7.2). Both analog and digital (P25) calls can be received in the mixed mode.

Talk Group

Group ID - This selects the Project 25 talk group that is assigned to the channel. The talk group includes the Talk Group ID, talk group alias, secure strapping mode, and encryption key address. Talk Groups are programmed in the Per System screen (see Section 7.1).

Group Selection

Strapped To Selected Group - The talk group on the channel is always the programmed talk group and cannot be changed.

List Selectable - The talk group may be changed using the Digital TG Select function button.

Other

Busy Channel Lockout

Off - Disables this feature.

Noise - Transmitting is disabled if a carrier is detected.

NAC - Transmitting is disabled if an incorrect NAC code is detected (or CTCSS/DCS if mixed mode is enabled). An incorrect code is any code not programmed for the current channel.

Keypad DTMF

If this box is checked, manual dialing of numbers using the DTMF keypad is allowed. This is available in the mixed mode only.

ANI

If the Mixed Mode and Tx Type = Analog are selected, ANI can be programmed similar to that described in Section 7.2.

Override Talkgroup Security Settings*

　This allows the encryption strapping mode and key location to be set on a per channel basis instead of just on a per talk group basis. If "Yes" is selected in the drop down menu, the selected strapping mode and key location overrides the talk group programming if applicable (conventional digital channels only).

SECTION 8　SMARTNET AND SMARTZONE SYSTEMS AND CHANNELS
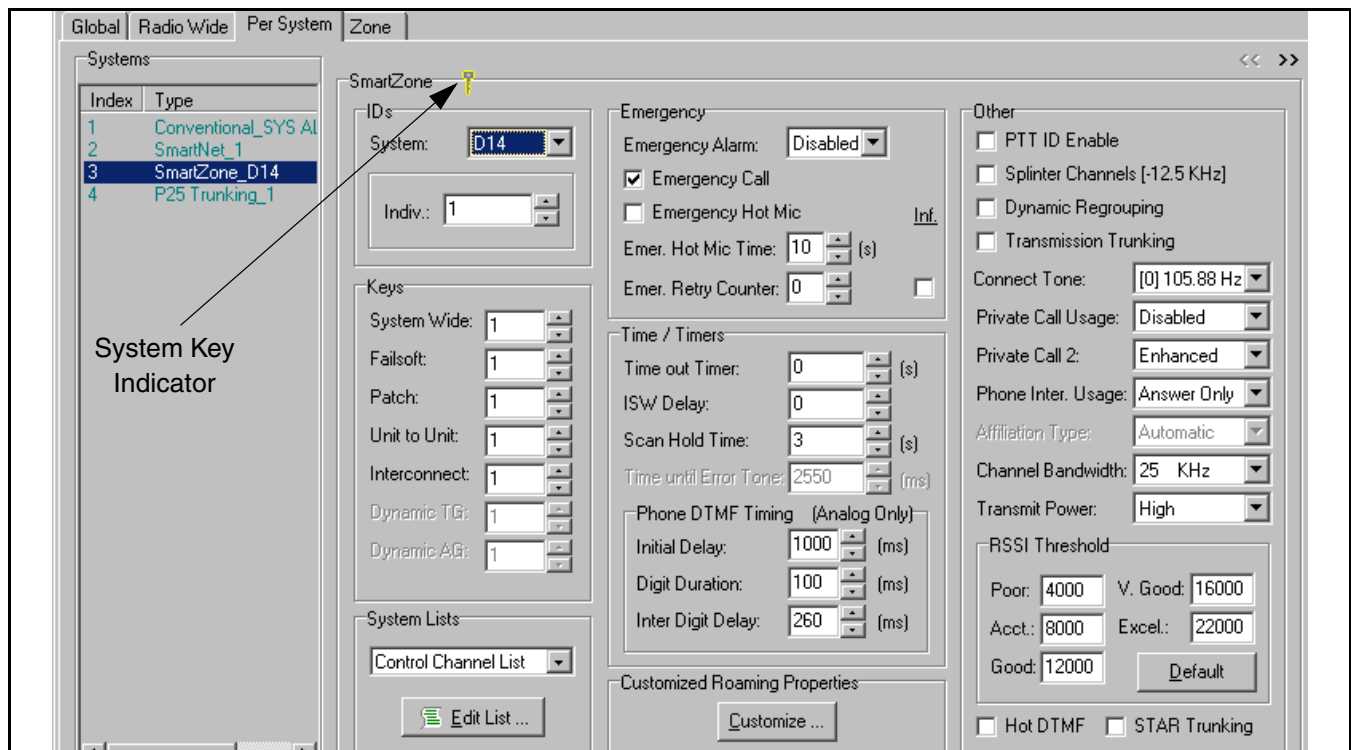
Figure 8-1　SMARTNET/SmartZone System Screen

8.1 INDIVIDUAL SMARTNET/SMARTZONE SYSTEM PARAMETERS

NOTE: Some SMARTNET/SmartZone trunking parameters can be edited only if the proper system key is detected. A key is being detected if a yellow key icon is indicated as shown in Figure 8-1. If there is a red "X" through this icon, a key is not being detected. Refer to Section 13 for more information.

　Individual system parameters are programmed by the "Per System" screen shown in Figure 8-1. These parameters can be programmed after the desired systems have been set up as described in Section 1.10.

　There are also radio wide system parameters that are programmed by the Radio Wide screen as described in Section 5.6. For information on programming individual Conventional and Project 25 Trunked system parameters, refer to Sections 7.1 and 9.1.

　The parameters in the individual SMARTNET/SmartZone System screen are as follows:

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* *This feature available only in 51xx/53xx models with Flash code 2.x or 3.x (see Section 16).*

IDs

NOTE: These IDs can be entered in either decimal or hexadecimal format (see Section 1.9.4)

System ID - This drop down list selects the system ID of the system. This ID comes from the system key in the "Keys" folder (see above "Note"). System ID numbers can be 1-65535 or 0001-FFFF hex. If a valid system key is not detected, only a default ID of "1" can be selected.

Individual ID - Uniquely identifies the radio on a particular system. Each radio must have a different Unit ID. Valid Unit IDs are 1-65535. If the "Hex" box is checked, the Individual ID can be entered as a hexadecimal number instead of a decimal number.

Keys

Programs the following encryption key ID (hardware location) that is used for all except group calls.

System Wide - Key used for system-wide calls (typically originated by the dispatcher).

Failsoft - Key used in failsoft conditions.

Patch - Key used in patch calls.

Unit To Unit - Key used for unit-to-unit (private) calls.

Interconnect - Key used for telephone interconnect calls.

System Lists - Refer to page 47 for information on these lists.

Emergency

Emergency Alarm

Disabled - No emergency signal is sent when the user presses the Emergency option switch.

Normal - An emergency alarm is sent when the user presses the Emergency option switch. If the Emergency Call is disabled, the alarm always occurs on the selected group. If the Emergency

Call is enabled, it occurs, in order of preference, on the Emergency group, selected group, and Announcement group. When an emergency condition is sent, the red transmit indicator lights, an emergency tone sounds, and EMERGNCY flashes in the display. EMERGNCY continues to flash until power is cycled, the channel is changed, or the Emergency switch is pressed and held**.

Silent - Same as "Normal" except none of the above audio or visual indications occur.

Emergency Call

Enable - When this box is checked, if the Emergency option switch and then the PTT switch are pressed, an emergency call is transmitted on the Emergency group. The emergency mode is canceled by cycling power or pressing and holding** the Emergency switch.

Disable - When this box is not checked, an emergency group call is not authorized.

Emergency Hot Mic

Enable - When this box is checked and an emergency alarm is sent by pressing the Emergency switch, automatic transmitting occurs with the microphone audio unmuted (without user intervention) for the time specified by the following Emergency Hot Mic Time. If it is not checked or if neither emergency call is selected, automatic transmissions do not occur. This feature is initiated only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. This function resets if the channel is changed.

Disable - When this box is not checked, automatic transmissions do not occur.

Emergency Hot Mic Time - Defines the period during which transmissions occur. Times of 10-120 seconds in 10-second steps can be selected.

Emergency Retry Counter - When "Infinite" is checked, an emergency call is repeated until acknowledged or canceled. When it is not checked, calls are attempted only the specified number of times.

*** This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.*

SmartZone Customized Roaming Properties Screen (SmartZone/P25 Trunked Only)

Time/Timers

Time-Out Timer - Programs the time-out timer setting for the system. It can be programmed for 15-225 seconds in 15-second steps or it can be disabled (0).

ISW Delay Time - Increasing or decreasing this value changes the transmission timing of ISWs relative to the reception of OSWs.

Scan Hold Time - Programs the delay that occurs after a message is no longer received before scanning resumes. Times of 2-10 seconds can be programmed.

Phone DTMF Timing (Analog Only)

Initial Delay - Delay from 10-500 milliseconds from when a traffic channel is granted for phone interconnect to the start of the dialing out of the phone number.

Digit Duration - Duration from 10-500 milliseconds of each phone number digit.

Inter-Digit Delay - Delay from 10-500 milliseconds between each digit of a phone number.

Customized Roaming Properties

SmartZone and Project 25 Trunked roaming properties can be customized by clicking the [Customize ...] button. The screen shown above is then displayed. Information programmed in this screen is described in the "Notes" window that is displayed. The RSSI Filter slider bar controls how quickly the radio reacts to dropouts in the RSSI level. The more aggressive the setting, the quicker site switching occurs.

Other

PTT ID Enable - When selected, the radio can key during the programmed hang time and continue the conversation on the active channel (similar to message trunking). If a user keys during the hang time, re-affiliation with the system occurs before using the voice channel. The voice channel is held while this re-affiliation occurs, and the call is then routed to the open voice channel. This results in all traffic being logged, even the radios which transmit during the hang time.

If neither PTT ID Enable or Transmission Trunking which follows is selected, operation is similar to that

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above except that re-affiliation does not occur during the hang time. Therefore, radios that key up during the hangtime do not affiliate and are not logged and only the radio initiating the call is logged.

Splinter Channels - When checked, the receive and transmit frequencies are 12.5 kHz lower than the normal frequencies. Splinter channels are used only as required in the Mexico and Canada border areas for frequencies between 806 and 820.975 MHz.

Dynamic Regrouping - When checked, a dynamic regrouping channel can be programmed. This is a SMARTNET/SmartZone channel which has the talk group dynamically set by the dispatcher. It is selected on the channel screen (see Section 8.3).

Transmission Trunking - Hangtime is not used and the radio must affiliate and receive a new channel grant on every PTT. When a radio unkeys, the channel is immediately available for other users, and all traffic is logged. If this parameter is not selected, see preceding PTT ID Enable description.

Connect Tone - The tone expected by the controller on the traffic channel to verify that a subscriber transmission is occurring. This tone should be set the same as it is in the controller.

Private Call Usage

Disabled - Private calls cannot be placed or received.

Response Only - Private calls can be received but not placed.

List Only - Private calls can be placed and received, and numbers can be recalled from a preprogrammed list only.

Unlimited - Private calls can be placed and received, and numbers can be recalled from a preprogrammed list or dialed using a microphone keypad. This mode is currently not supported with 5300 radios and the preceding "List Only" mode should be used instead. *NOTE: To enter this mode with the 51xx, the key must be pressed and held for a short time until a tone sounds.*

Private Call 2

Standard - Selects the standard Private Conversation mode in which the user does not receive any feedback when the called radio is not active in the system. Only a "No Answer" is received if the called radio does not answer.

Enhanced - Selects the Enhanced Private Conversation™ mode. When a call is placed with this mode, the system tells the user if the called radio is currently active in the system and within range. The calling radio displays "No Ack" if the called radio is not active in the system and "No Answer" if it is active but does not answer.

Phone Interconnect Usage - Programs operation of telephone calls same as "Private Call Usage" above.

Affiliation Type (SMARNET Only)

Automatic - The radio immediately affiliates with the central controller as soon as it is turned on and automatically re-affiliates each time the talk group is changed.

On PTT - The radio affiliates with the central controller each time the PTT switch is pressed, even when pressed during the hang time. Also, when the radio is keyed during the hang time, the currently active channel is held active during the re-affiliation and the re-affiliated radio continues traffic on this channel.

Channel Bandwidth - Selects the channel bandwidth as 25, 20, or 12.5 kHz. When "20 kHz" is enabled, the radio operates with a 4 kHz maximum deviation between 821.000 and 824.975 MHz and 5 kHz maximum deviation for all other frequencies. When 12.5 kHz is selected, deviation is 2.5 kHz with all frequencies.

Transmit Power - Fixes the transmit power on the system for the high or low level or makes it selectable (the high/low power function switch is then required).

RSSI Threshold (SmartZone/P25 Trunked Only) - Sets the RSSI (Receive Signal Strength Indicator) levels that determine when searching for and switch

to another site occurs. Do not change the default levels unless you are familiar with how these settings affect operation.

Hot DTMF - When enabled, DTMF digits are sent when buttons are pressed when transmitting in the SMARTNET/SmartZone analog mode.

STAR Trunking - Selects this feature which is available with SmartZone systems. The system selected in the "System ID" box is then regarded as the "Home" system and no other system information is required to use this feature. The talk groups must be entered as with non-Omnilink systems, and all other programming occurs on the infrastructure side. All required roaming information is received via adjacent site control channel data.

SMARTNET/SmartZone System Page 2 Screen Description

An additional system screen is opened/closed by clicking the ‹‹ ›› buttons in the upper right corner of the screen. The following additional parameters are then displayed:
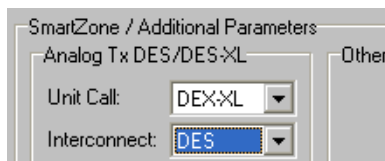
Analog Transmit DES/DES-XL* - Allows the type of encryption to be specified individually for Unit and Interconnect calls made in the analog mode. DES-XL is available only with the Motorola encryption module (see Section 16).

8.2 SMARTNET/SMARTZONE SYSTEM LISTS

The various SMARTNET/SmartZone lists are selected by the System Lists drop-down list on the SMARTNET/SmartZone Per system screen (see Figure 8-1). After the desired list is selected, it is edited by clicking the 📋 Edit List ... button. Descriptions of the various lists and the information they program follow.

Control Channel List

The Control Channel List screen which follows allows the system manager to view and edit the control channels. Each SMARTNET system can have up to

four control channels, and each SmartZone system can have up to 48 control channels. With the 5300 Rev 4 or earlier logic board, up to 32 SmartZone entries are allowed. Only one control channel is active at a time.
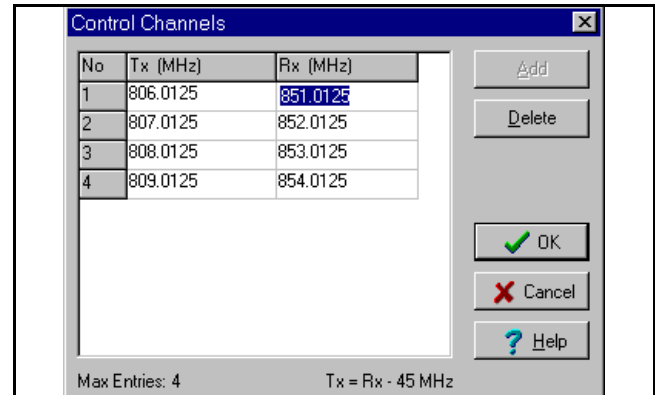
To display this screen, on the SMARTNET/ SmartZone Per System screen, select Control Channel List in the drop-down list and then click the 📋 Edit List ... button (see Figure 8-1).

To add a channel, click the Add button, and to delete a channel, simply select it and click the Delete button. To edit a channel, select the digits to be changed and edit them as desired. For the 800 MHz band, only the receive channel frequency can be changed and the transmit frequency is automatically calculated (45 MHz below the receive frequency). These are the mobile frequencies, not the repeater frequencies. Only multiples of 5 kHz and 6.25 kHz are valid.

Status Alias List

The Status Alias List screen shown above programs the alias for each of up to eight status condi-

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* This feature available only in 51xx/53xx models with Flash
   code 2.x or 3.x (see Section 16).

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tions that can be sent. The meaning of each status number is defined by the system manager.

To display this screen, on the SMARTNET/ SmartZone Per System screen, select Status Alias List in the drop-down list and then click the ⊟ Edit List ... button (see Figure 8-1). To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to 10 characters can be entered that identify the status. This identification is displayed when the user selects a status condition.

Message Alias List

The Message Alias List screen which follows associates an alias (name) with each message number. The meaning of each message number is defined by the system manager.
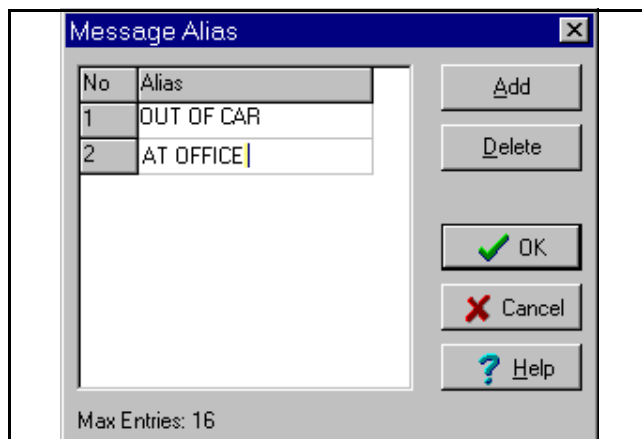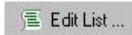
Message Alias List Screen

To display this screen, on the SMARTNET/ SmartZone Per System screen, select Message Alias List in the drop-down list and then click the ⊟ Edit List ... button (see Figure 8-1). To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to 10 characters can be entered that identify the message. This identification is displayed when the user selects a message.

Call List

The Call List screen which follows programs the list of IDs used for private calls. A maximum of 255 IDs can be programmed. To display this screen, on the

SMARTNET/SmartZone Per System screen, select call list in the drop-down list and then click the ⊟ Edit List ... button (see Figure 8-1).

To add a call, click the Add button, and to delete an call, simply select it and click the Delete button. To edit an Alias or ID, select it and enter the desired information as follows:

Alias - Up to ten characters can be entered to identify the user being called. This identification is displayed when the mobile to be called is selected by the user from the list. In addition, when a call is received from a unit in this list, the alias of the unit is then displayed instead of the unit ID number. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the ID of the radio being called. Valid entries are 0 - 65535. A "0" is detected as no entry.

Phone List
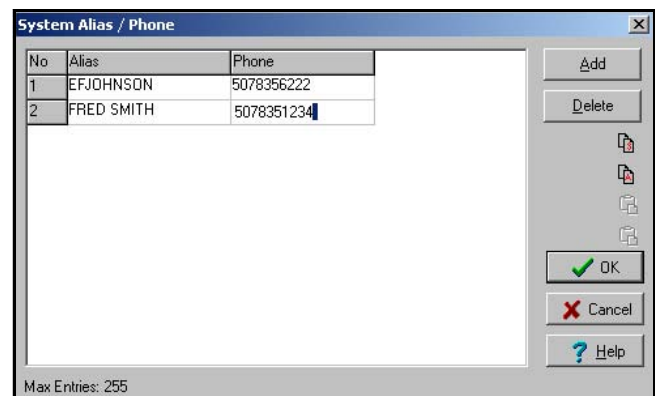
The Phone List screen shown above programs the telephone number list used for placing telephone calls if applicable. A maximum of 255 numbers can be

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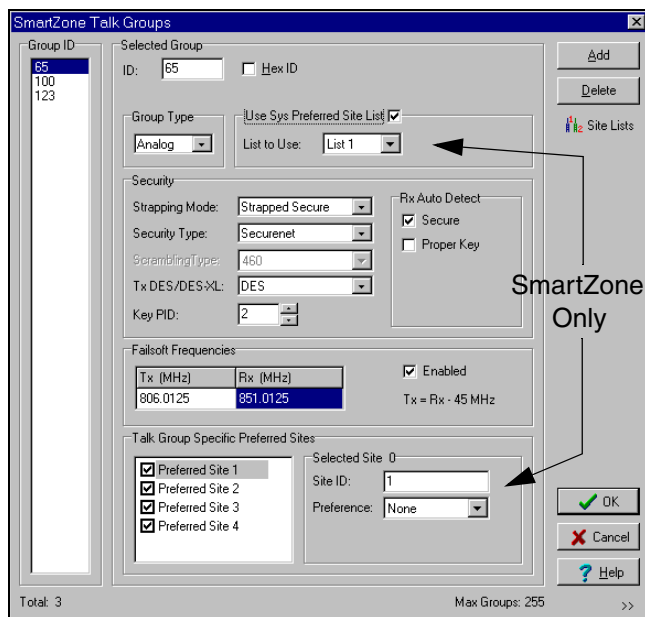
programmed. To display this screen, on the SMARTNET/SmartZone Per System screen, select Phone List in the drop-down list and then click the [Edit List ...] button (see Figure 8-1).

To add a call, click the [Add] button, and to delete an call, simply select it and click the Delete button. To edit an alias or number, select it and enter the desired information as follows:
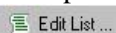
Alias - Up to ten characters can be entered to identify the number being called. This identification is displayed when the number to be called is selected by the user from the list. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the telephone number dialed when the location is selected. The 3-digit area code and 7-digit telephone number are entered using the numbers 0-9.

Talk Group List

The Talk Group List screen shown above sets up SMARTNET/SmartZone talk groups and programs unique talk group information. To display this screen, on the SMARTNET/SmartZone Per System screen, select the Talk Group List drop-down system list and then click the [Edit List ...] button (see Figure 8-1).

The parameters programmed in this screen are as follows:

Group ID - This list displays the talk group IDs currently contained in the Talk Group list. To edit a talk group ID in this list, select it and then change it in the Selected Group box. This is the actual ID of the talk group. Talk groups are assigned to channels in the Zone screen (see page 55). *NOTE: This ID can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.*

[Add] - Clicking this button adds the next available talk group ID to the list. Each SMARTNET/SmartZone system can be programmed with up to 255 talk groups.

To add an entire block of talk group IDs or a specific ID, click the arrow button [>>] in the lower right corner of the screen. The following screen is then displayed:

Add Mode Drop Down List - "Single" adds the next available ID similar to the preceding "Add" button. "Multiple" adds a block of IDs as follows. To initiate the selected add operation, click the preceding "Add" button. If the specified ID range results in duplicate IDs, an error message is displayed and no IDs are added.

Start ID - Specifies the starting ID of the block.
ID Count - Specifies the number of IDs to be added.
ID Step - Specifies if consecutive IDs are added or some other step rate is used.

For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

[Delete] - Clicking this button deletes the talk group that is currently selected in the list.

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Group Type - Selects either Analog or Digital signaling on the talk group.

Use System Preferred Site List (SmartZone Only) - Selects one of the preferred sites for the talk group. Refer to the "Preferred Sites" description which follows for more information.

Strapping Mode

Strapped Clear - All transmissions on the talk group occur in the clear (unscrambled) mode.

Strapped Secure - All transmissions on the talk group occur in the secure (scrambled) mode selected as follows.

Switched Mode - The clear or secure status of the talk group is selected by the Clear/Secure option switch.

Security Type

NOTE: Voice encryption is an optional feature that requires factory programming and possibly special hardware.

SecureNet - Selects the Motorola SecureNet DES type of secure communication when either the coded or switched strapping mode is selected.

Scrambling - Selects the Transcrypt 460 type of secure communication when either the coded or switched strapping mode is selected (not available with 5100 and later 5300 models).

Scrambling Type

When Transcrypt scrambling is selected, selects the type. Currently, only the 460 type is available.

Tx DES/DES-XL

With analog channels, when SecureNet secure communication is selected, selects either the DES or DES-XL type. (With the 51xx, DES-XL is available only in later models equipped with the UCM module.) On digital channels, the type is not selectable and both DES-OFB and AES* encryption are supported. The actual type used is deter-

mined by the encryption key that is selected by the talk group (see following).

Key PID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Rx Auto Detect

Secure - If this option is checked, an encrypted signal is automatically detected and received. This option may increase the response time to incoming signals. If it is not checked, those signals are detected only if they are coded like the transmit signals.

Proper Key - If this option is checked, the radio will search the available encryption keys until it finds a match for the current transmission.

Failsoft Enable - If this box is checked, a failsoft channel is enabled on the talk group if a controller or other major failure occurs. If this box is not checked, the failsoft mode is not entered if a failure occurs.

Tx/Rx Frequency - Programs the failsoft channel frequency if "Enable" is checked.

Preferred Sites (SmartZone Only)

With SmartZone systems, up to four Preferred Sites and/or a Preferred Site List* can be associated with each talk group. This forces a call on the talk group to access the specified sites. The system manager can then keep mobiles on specific sites even if the "Site Search" feature has not been enabled. The preference for each site can be programmed for Least, None, Preferred, or Always as follows.

The Preferred Site Lists are programmed by the System Preferred Site List screen described on page 52. Up to 16 lists can be programmed, and each site can include up to 16 sites.

If both a Preferred Site List and one or more Preferred Sites (selected at bottom of screen) are associated with a talk group, the Preferred Sites at the bottom are searched first. The first entry found for a given site is used. If the same site is in both lists, the entry in the list at the bottom of the screen is used first.

Use Sys Preferred Site List* - When this box is checked, the talk group is associated with a Preferred Site List. The specific site list is selected by the drop down list.
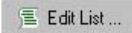
![Site Lists] - Displays the Preferred Site List screen described on page 52 as a quick reference to determine which sites are included in each site list. This screen is for informational purposes only, so lists can be viewed but not be edited. Clicking the "Select into Talk Group" button sets the "List To Use" field in the main screen to the selected list.

Talk Group Specific Preferred Sites - Up to four individual sites can also be associated with each talk group (see preceding information). Sites are enabled using the checkbox, the applicable site ID is entered in the Site ID box, and the drop down list programs the selected site preference for Least, None (no preference), Preferred, or Always (preferred).

Announcement Group List
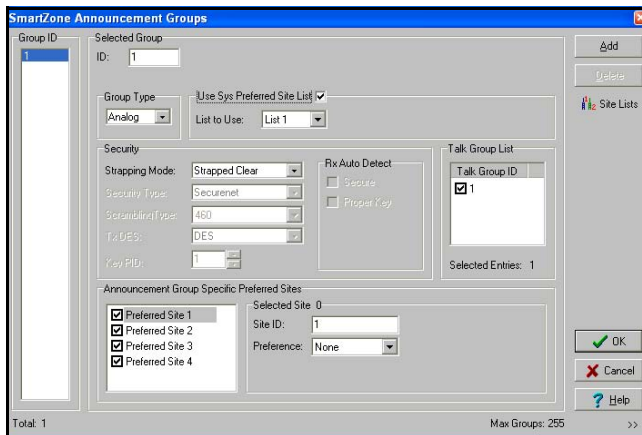
The Announcement Group List screen which follows sets up SMARTNET/SmartZone announcement groups that are used to communicate with several talk groups simultaneously. Each announcement group can have up to 15 talk groups.

To display this screen, on the SMARTNET/ SmartZone Per System screen, select the Announcement Group List in the drop-down list and then click the ![Edit List ...] button (see Figure 8-1). The parameters programmed in this screen are as follows:

Group ID - This list displays the Announcement group IDs currently contained in the Announcement

Group list. To edit an ID in this list, select it and then change it in the Selected Group box. This is the actual ID of the announcement group. Announcement groups are assigned to channels in the Zone screen (see page 55). *NOTE: This ID can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.*

![Add] - Clicking this button adds the next available announcement group ID to the list. Each SMARTNET/SmartZone system can be programmed with up to 255 announcement groups.

To add an entire block of announcement group IDs or a specific ID, click the arrow button ![>>] in the lower right corner of the screen. The following screen is then displayed. Refer to the preceding "Talk Group List" description for more information on this screen.

![Delete] - Clicking this button deletes the announcement group that is currently selected in the list.

Group Type - Selects either Analog or Digital signaling on the announcement group.

Use System Preferred Site List (SmartZone Only) - Selects one of the preferred sites for the announcement group. Refer to the preceding Talk Group List description for more information.

Security - Programs the secure communication operation on each announcement group similar to talk groups described in the preceding "Talk Group List" description.

Talk Group ID - Selects the talk groups that are included in each announcement group.

Preferred Sites (SmartZone Only) - Programs the preferred site information similar to talk groups described in the preceding "Talk Group List"
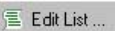
description. Up to four Preferred Sites and/or a Preferred Site List a can be associated with each announcement group.

Priority Scan List
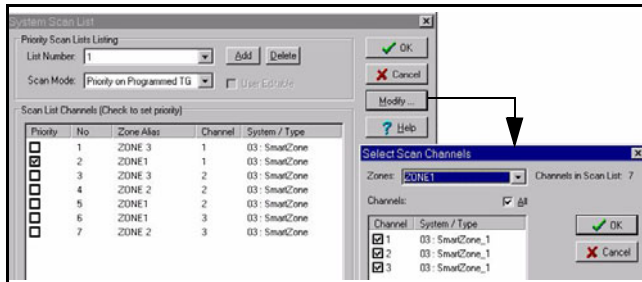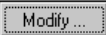
NOTE: Before the priority monitor scan lists can be programmed as follows, the channels to be included in these lists must be set up in the Zone screen as described in Section 8.3 on page 54.

The Priority Scan List screen shown above sets up the Priority (Standard) Scan lists that can be programmed on each SMARTNET or SmartZone system. Each scan list can include up to 16 channels, one of which may be a priority channel. These channels must be from the same SMARTNET or Smart-Zone system. Channels from other systems are not allowed. With the 5300 Rev 6 logic board and 51xx portables, up to as many lists can be programmed as can be stored in the available memory. With other radios, up to three lists can be programmed.

To display this screen, on the SMARTNET/ SmartZone Per System screen, select Priority Scan List in the drop-down list and then click the
| Edit List ... | button (see Figure 8-1).

List Number - This drop-down list selects the scan list to edit. Click the "Add" button to add a scan list and "Delete" to delete a scan list.

| Modify ... | - Clicking this button displays the screen shown on the right above which is used to edit the selected scan list. Check the channels in each zone to be included in the selected scan list. Repeat for the other scan lists if applicable.

Scan Mode - If priority scan is used on a list, select "Priority on Selected" (51xx/53xx only) or "Priority

on Programmed" from the drop down list. If priority scanning is not used, select "Non Priority Scan". If "Priority on Programmed" is selected, check the priority box of the desired priority channel.

NOTE: Priority talk group scanning must also be supported at the system level for it to occur as programmed. Talk Groups programmed as "Priority" in PCConfigure must also be designated as Priority Monitor Groups by the System Control software.

Site List (SmartZone Systems Only)
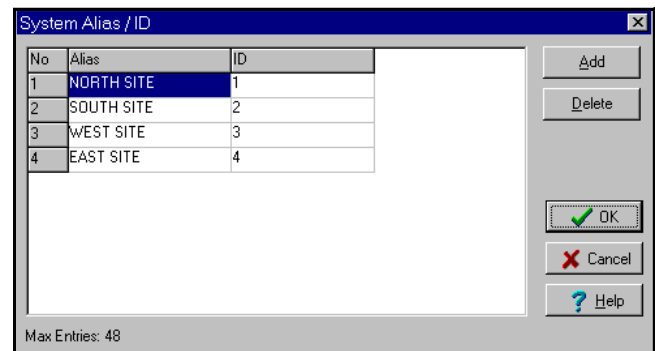
Sites in a SmartZone system are designated by a number. The Site List screen shown above programs an alias for each site number that is displayed when using the Site Search feature.

To display this screen, on the SmartZone Per System screen, select Site List in the drop-down list and then click the | Edit List ... | button (see Figure 8-1). To add an alias, click the | Add | button, and to delete an alias, simply select it and click the Delete button. To edit an alias or ID, simply select it and make the desired changes.

Alias - Programs up to 10 alphanumeric characters that identify the site.

ID - Site ID from 0-48. With the 5300 Rev 6 logic board, up to 255 entries are supported.

System Preferred Site List (SmartZone Systems Only)*

The Preferred Site List screen which follows programs up to 16 Preferred Site Lists. These lists can be associated with individual talk groups on the Talk

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Group List screen described starting on page 49. This forces calls on a talk group to access specific sites. The preference for each site in a list can be set for Least, None, Preferred, or Always as follows.

Each list can be programmed with up to 16 sites. Therefore, the use of Preferred Site Lists allows up to 16 sites to be associated with a group instead of just 4 available on the Talk Group List screen. In addition, if several talk groups are associated with the same sites, a list can simply be selected instead of separate sites.

Site Lists - This drop down list selects the list to be edited. To add a new list, click the "Add" button. To delete the selected list, click the "Delete" button.

Sites In List - To add/delete a site from the list, click the checkbox.

Site ID - Enter the site ID from 0-48.

Preference - Select the site preference in the drop down list. A default weighting is usually assigned to these preference levels which results in the most preference given to "Always" and the least prefer-ence to "Least" as follows:

1. Always (preferred)
2. Preferred
3. None (no preference)
4. Least (preferred)

Other Band Trunking List (VHF/UHF Only)
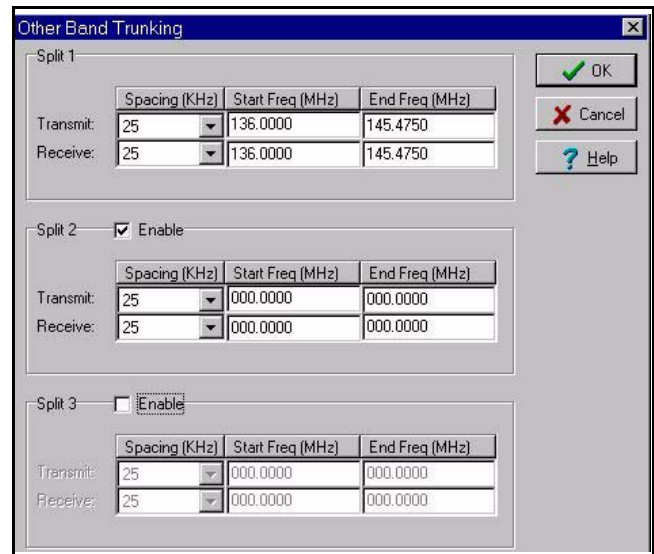
The Other Band Trunking screen shown above can be displayed only when programming channels in the VHF and UHF frequency bands. It is used to define the relationship between transmit and receive channel frequencies in these bands. With 800 MHz systems, this is not required because the difference between transmit and receive frequency is always 45 MHz.
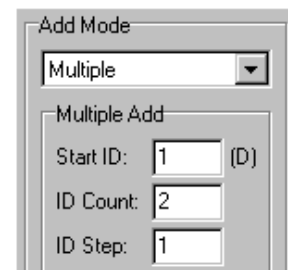
To display this screen, on the SMARTNET/ SmartZone Per System screen, select the Other Band Trunking in the drop-down list and then click the Edit List ... button (see Figure 8-1).

This screen organizes the available frequency band into three sub-bands, called splits. Each split is

defined by a start frequency, stop frequency, and channel spacing as follows. Frequencies outside the defined split cannot be accessed by the radio. These frequency splits must be defined the same way they are defined for the trunking controller.

Tx and Rx Spacing - Spacing in kHz between each potential transmit and receive frequency.

Tx and Rx Start Frequency - Start in MHz of the band split for transmit and receive frequencies.

Tx and Rx Stop Frequency - Stop in MHz of the band split for transmit and receive frequencies.

User Group ID List*

This User Group ID List screen shown on the left programs aliases that can be displayed if a call is received on a talk group ID within the programmed block. For example, with the preceding screen, if a group call is received on group IDs 234-264, the alias "Fire" can be displayed. The display of this alias is controlled by the "User Group ID" parameter on the Radio Wide screen.

Figure 8-2   SMARTNET/SmartZone Channel Screen

8.3 SMARTNET/SMARTZONE CHANNEL PARAMETERS

After the desired channels have been set up as described in Section 6.3, individual channel parameters can be programmed. Select the Zone screen shown in Figure 8-2 and then select the desired Zone using the drop-down list in the "Zones" box. Screens which program individual channel parameters are selected by clicking the channel in the "Channels" box.

The parameters displayed when a SMARTNET/ SmartZone channel is selected are as follows. Conventional and Project 25 Trunked channels are described in Sections 7 and 9.

Channel Parameters

Channel Type - Indicates the type of channel that is currently selected in the "Channels" box.

Channel Alias - Programs the alias (identification) that is displayed when the channel is selected. Up to ten characters can be programmed.

Scan List - Selects the priority (standard) scan list selected by the channel. If "No List" is selected, scanning is not selectable on that channel.

Auto Scan - When this is checked, the radio automatically begins scanning the scan list associated with

* This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

the channel whenever the channel is selected. When it is not checked, scanning must be started manually by the Scan option switch.

IDs

Operation with the various combinations of Talk Groups (TGs) and Announcement Groups (AGs) is as follows:

Talk Group Only - Transmit on TG, receive on TG.
Announcement Group Only - Transmit on AG, receive on all TGs in AG.
Talk and Announcement Groups - Transmit on TG and receive on TG plus AG but not the TGs assigned to the AG.

NOTE: These IDs can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.

Talk Group ID - Selects the talk group selected by that channel. Talk Groups are programmed by selecting "Talk Group List" on the Per System screen (see page 49).

Announcement Group ID - Selects the receive-only announcement group selected by that channel. Announcement Groups are programmed by selecting "Announcement Group List" on the Per System screen (see page 51).

Emergency Group ID - Selects the talk group used for emergency calls on the channel.

Other

Talk Permit Tone - When this feature is checked, a short tone sounds after a request for a group call has been approved by the main controller. This indicates that speaking can begin. When not checked, no audio feedback is used to indicate when speaking can begin.

Make Dynamic Regrouping Channel - Checking this box designates the channel as the dynamic regrouping channel. The talk group is then programmed over the air, so the Talk Group ID and Announcement Group ID are not programmable.

Dynamic Regrouping must be enabled on the System screen to program a dynamic regrouping channel. The dynamic talk group does not need to be a programmed group.

Transmit Disable* - When this feature is checked, transmitting is disabled on the channel, and it can be used for monitoring only.

* This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

SECTION 9   PROJECT 25 TRUNKED SYSTEMS AND CHANNELS

Figure 9-1   P25 Trunked System Screen

9.1 INDIVIDUAL P25 TRUNKED SYSTEM PARAMETERS

NOTE: Some P25 trunking parameters can be edited only if the proper system key is detected. A key is being detected if a yellow key icon is indicated as shown in Figure 8-1. If there is a red "X" through this icon, a key is not being detected. Refer to Section 13 for more information.

Individual system parameters are programmed by the "Per System" screen shown in Figure 9-1. These parameters can be programmed after the desired systems have been set up as described in Section 1.10.

There are also radio wide system parameters that are programmed by the Radio Wide screen as described in Section 5.7. For information on program-ming individual Conventional and SMARTNET/ SmartZone system parameters, refer to Sections 7.1 and 8.1.

The parameters in the individual P25 Trunked System screen are as follows:

IDs

NOTE: These IDs can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.

System ID - This drop down list selects the Home System ID of the radio. This must be a unique ID within a Wide Area Communications Network (WACN). This ID comes from the system key in the "Keys" folder (see above "Note" at beginning of this section). System ID numbers can be 1-4094 (001-FFE hex). If a valid system key is not detected, only a default ID of "1" can be selected.

WACN - This ID determines the home Wide Area Communications Network to which the radio is assigned. One or more systems make up a WACN. Valid WACN IDs are 1-1048574 (00001-FFFFE hex).

Site - Specifies the home site of the radio. If the Zone Fail Site Lock feature is enabled, this also determines the site to which the radio is restricted.

RFSS - Specifies the RF subsystem (zone controller) that is used as the default, or that the radio is restricted to if the SmartZone coverage option is enabled. One or more RF Subsystems make up a system. Valid IDs are 0-254.

Unit - Provides a unique identification of the radio on a system. Therefore, each radio must have a different Unit ID. Valid Unit IDs are 1-16,777,215 (000001-FFFFFF hex). The decimal version of this ID is the private call ID of the radio.

Keys

Programs the following encryption key ID (hardware location) that is used for all except group calls.

Failsoft - Key used in failsoft conditions.

Patch - Key used in patch calls.

Private Call - Key used for unit-to-unit (private) calls.

Interconnect - Available with a future release.

Dynamic Talk Group - Available with a future release.

System Lists - Refer to page 59 for more information.

Emergency

Emergency Alarm

Disabled - No emergency signal is sent when the user presses the Emergency option switch.

Normal - An emergency alarm is sent when the user presses the Emergency switch. If the Emergency Call is disabled, the alarm always occurs on the selected group. If the Emergency Call is enabled, it occurs, in order of preference, on the Emergency group, selected group, and Announcement group. When an emergency condition is sent,

the red transmit indicator lights, an emergency tone sounds, and EMERGNCY flashes in the display. EMERGNCY continues to flash until power is cycled, the channel is changed, or the Emergency switch is pressed and held.*

Silent - Same as "Normal" except none of the above audio or visual indications occur.

Emergency Call

Enable - When this box is checked, if the Emergency option switch and then the PTT switch are pressed, an emergency group call is transmitted on the Emergency group. The emergency mode is canceled by cycling power or pressing and holding* the Emergency switch.

Disable - When this box is not checked, an emergency group call is not authorized.

Emergency Hot Mic

Enable - When this box is checked and an emergency alarm is sent by pressing the Emergency switch, automatic transmitting occurs with the microphone audio unmuted (without user intervention) for the time specified by the following Emergency Hot Mic Time. If it is not checked or if neither emergency call is selected, automatic transmissions do not occur. This feature is initiated only by the first press of the Emergency switch. Subsequent presses do not trigger automatic transmissions. This function resets if the channel is changed.

Disable - When this box is not checked, automatic transmissions do not occur.

Emergency Hot Mic Time - Defines the period during which transmissions occur with the microphone audio unmuted (without user intervention). Times of 10-120 seconds in 10-second steps can be selected.

Emergency Retry Counter - When "Infinite" is checked, an emergency call is repeated until acknowledged or canceled. When it is not checked, calls are attempted only the specified number of times.

This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

Time/Timers

Time-Out Timer - This timer determines the maximum length of a continuous transmission. It can be programmed for 15-225 seconds in 15-second steps or it can be disabled (0).

RFSS Response Time - Specifies the time between attempts to affiliate on RFSS sites. Times of 625-7000 ms can be programmed with a default of 625 ms.

Force Unmute Time - Specifies the maximum time the radio remains muted after transmitting because of probable system throughput delay. If it is determined that the incoming audio signal is from some other radio, this delay is disregarded. Times of 25-6375 ms can be programmed with a default of 1200 ms.

PTT Warning Time - Specifies the time the radio waits before sounding the PTT Prohibit Tone to warn the user that the PTT request is being processed and the PTT switch should be released. Times of 25-6375 ms can be programmed with a default of 4000 ms.

Busy Update Timer - Specifies the time the radio waits in a busy state for a reject, grant, or another busy update from the radio system. When this timer expires, a response is no longer expected from the system and the transmission is retried. Times of 15-945 seconds can be programmed with a default of 30 seconds.

Response Pending Timer - Specifies the time the radio waits when expecting a further response from the radio system to a request. This occurs when the system sends a response indicating that the request is being processed and a response is coming. When this timer expires, a response is no longer expected and the radio returns to the idle state. Times of 1-255 seconds or infinite can be programmed with a default of 6 seconds.

ISP Sequence Length - Specifies the time allowed per site for an ISP retry request. The radio retries until this timer expires (at least five retries are made regardless of this timer setting). Times of 1-255 seconds or infinite can be programmed with a default of 5 seconds.

Quick Fade Protect - Specifies the time the radio will stay on the control channel when synchronization is lost before resynchronizing. This allows recovery without performing a full resynchronization of the channel. Times of 200-6575 ms can be programmed with a default of 2000 ms.

Scan Hold Time - Specifies the delay that occurs after a message is no longer received before scanning resumes. Times of 2-10 seconds can be programmed with a default of 3 seconds.

Other

Talk Permit Tone - When selected, a short tone sounds after a request for a group call has been approved by the main controller. This indicates that speaking can begin. When not checked, no audio feedback is used to indicate when speaking can begin.

Radio Inhibit - When selected, the dispatcher can disable/enable the radio. When this command is received by the radio, an acknowledgment is sent to the dispatcher and then it is disabled as follows. The radio can be enabled again by the dispatcher or by reading and then re-writing the programming data using PCConfigure.

- Receive audio is muted and transmit audio disabled
- All radio controls are inoperative
- Scanning is disabled on the selected mode (P25 trunking)
- The transmit indicator is disabled and the display is blanked

Radio Check - When selected, the radio will respond to a remote check command. This command can be sent by the dispatcher to confirm that the radio is active and operational on the system. If this feature is not enabled, this command is ignored.

SmartZone Coverage Type - When selected, roaming is limited to the selected RFSS controller. If not selected, roaming can occur across all available RFSS controllers in the WACN system.

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Conversation Type

Message Trunking - Not available with P25 trunking.

PTT - ID - This mode is always selected with P25 trunking. This mode is always selected with P25 trunking. The radio can key during the programmed hang time and continue the conversation on the active channel. If a user keys during the hang time, re-affiliation with the system occurs before using the voice channel. The voice channel is held while this re-affiliation occurs, and the call is then routed to the open voice channel. This results in all traffic being logged, even the radios which transmit during the hang time.

Transmission Trunking - Not available with P25 trunking.

Status Aliasing - Enables and disables Status Aliasing for the system. This function permits customization of status numbers and allows an alias name to be assigned to each number.

Dynamic Regrouping - When checked, a dynamic regrouping channel can be programmed. This is a Project 25 trunked channel which has the talk group dynamically set by the dispatcher. It is selected on the channel screen (see Section 9.3).

Default RCM Address - Specifies the Radio Control Manager used as the target address of Inbound Signaling Packet (ISP) transmissions such as Status and Message transmissions. Hexadecimal addresses from 000000-FFFFFF can be programmed, and the default is FFFFFC.

Private Call Usage

Disabled - Private calls cannot be placed or received.

Response Only - Private calls can be received but not placed.

List Only - Private calls can be placed and received, and numbers can be recalled from a preprogrammed list only.
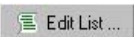
Unlimited - Private calls can be placed and received, and numbers can be recalled from a preprogrammed list or dialed using a microphone keypad. This mode is currently not supported with 5300 radios and the preceding "List Only" mode should be used instead. *NOTE: To enter this mode, the key must be pressed and held for a short time until a tone sounds.*

Call Alert Usage - Programs operation of Call Alert calls (pages) the same as "Private Call Usage" above.

Transmit Power - Fixes the transmit power on the system for the high or low level or makes it selectable (the high/low power function switch is then required).

Customized Roaming Properties - Same as with SmartZone operation. Refer to description on page 45.

9.2 P25 TRUNKED SYSTEM LISTS

The various P25 trunking lists are selected by the "System Lists" drop-down list on the P25 Trunking Per system screen (see Figure 9-1). After the desired list is selected, it is edited by clicking the 📋 Edit List... button. Descriptions of the various lists and the information they program follow.

Channel ID List (VHF/UHF Only)

The Channel ID List screen shown above can be displayed only when programming channels in the

VHF and UHF frequency bands (Other Band Trunking). Both Explicit* and Implicit addressing is now available.

With Implicit Addressing, only the receive frequency is sent by the control channel and information in this table is used to determine the transmit frequency. With Explicit Addressing, both the receive and transmit frequencies are sent. Both types reference information in this table. This table is not required with 800 MHz systems because the difference between transmit and receive frequency is always 45 MHz.

Control Channel List

The Control Channel List screen shown above allows the system manager to view and edit the control channels. Each P25 trunking system can have up to 255 control channels. Only one control channel is active at a time.

To display this screen, on the P25 Trunking System screen, select Control Channel List in the drop-down list and then click the Edit List ... button (see Figure 9-1).

To add a channel, click the Add button, and to delete a channel, simply select it and click the Delete button. To edit a channel, select the digits to be changed and edit them as desired. For the 800 MHz band, only the receive channel frequency can be changed and the transmit frequency is automatically calculated (45 MHz below the receive frequency). These are the mobile frequencies, not the repeater frequencies. Only multiples of 5 kHz and 6.25 kHz are valid.

Status Alias List

The Status Alias List screen shown above programs the alias for each of up to eight status conditions that can be sent. The meaning of each status number is defined by the system manager.

To display this screen, on the P25 Trunking Per System screen, select Status Alias List in the drop-down list and then click the Edit List ... button (see Figure 9-1). To add an alias, click the Add button, and to delete an alias, simply select it and click the Delete button. To edit an alias, select it and change it as desired. Up to 10 characters can be entered that identify the status. This identification is displayed when the user selects a status condition.

Call List

The Call List screen shown above programs the list of IDs used for unit calls. A maximum of 16 IDs can be programmed. To display this screen, on the P25 Trunking Per System screen, select call list in the drop-down list and then click the Edit List ... button (see Figure 9-1).

* This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

To add a call, click the [Add] button, and to delete an call, simply select it and click the Delete button. To edit an Alias or ID, select it and enter the desired information as follows:

Alias - Up to ten characters can be entered to identify the user being called. This identification is displayed when the mobile to be called is selected by the user from the list. In addition, when a call is received from a unit in this list, the alias of the unit is then displayed instead of the unit ID number. Only uppercase letters can be entered, so lowercase letters are automatically converted to uppercase by the program.

ID - This is the ID of the radio being called. Valid entries are 1-16,777,215. "0" is detected as no entry.

Talk Group List

The Talk Group List screen which follows sets up P25 Trunking talk groups and programs unique talk group information. To display this screen, on the P25 Trunking Per System screen, select the Talk Group List drop-down system list and then click the [Edit List ...] button (see Figure 9-1).

The parameters programmed in this screen are as follows:

Group ID - This list displays the talk group IDs currently contained in the Talk Group list. To edit a talk group ID in this list, select it and then change it in the Selected Group box. This is the actual ID of the talk group. Talk groups are assigned to channels in the Zone screen (see page 65). *NOTE: This ID can be*

entered in either the decimal or hexadecimal format as described in Section 1.9.4.

[Add] - Clicking this button adds the next available talk group ID to the list. Each P25 trunking system can be programmed with up to 255 talk groups.

To add an entire block of talk group IDs or a specific ID, click the arrow button [>>] in the lower right corner of the screen. The following screen is then displayed:

Add Mode Drop Down List - "Single" adds the next available ID similar to the preceding "Add" button. "Multiple" adds a block of IDs as follows. To initiate the selected add operation, click the preceding "Add" button. If the specified ID range results in duplicate IDs, an error message is displayed and no IDs are added.

Start ID - Specifies the starting ID of the block.
ID Count - Specifies the number of IDs to be added.

ID Step - Specifies if consecutive IDs are added or some other step rate is used. For example, if Start ID =10, ID Count = 5, and ID Step = 10, the IDs added are 10, 20, 30, 40 and 50.

[Delete] - Clicking this button deletes the talk group that is currently selected in the list.

Strapping Mode

Strapped Clear - All transmissions on the talk group occur in the clear (unencrypted) mode.

Strapped Secure - All transmissions on the talk group occur in the secure (encrypted) mode selected as follows.

Switched Mode - The clear or secure status of the talk group is selected by the Clear/Secure option switch.

Use System Preferred Site List - Selects one of the preferred sites for the talk group. Refer to the "Preferred Sites" description which follows for more information.

Encryption Key ID - Selects the location from 0-15 (PID/ASN mode) or 1-16 (SLN/CKR mode) of the key used for secure calls on the group if applicable.

Failsoft Enable - If this box is checked, a failsoft channel is enabled on the talk group if a controller or other major failure occurs. If this box is not checked, the failsoft mode is not entered if a failure occurs.

Tx/Rx Frequency - Programs the failsoft channel frequency if "Enable" is checked.

Preferred Sites

With P25 trunked systems, up to four Preferred Sites and/or a Preferred Site List* can be associated with each talk group. This forces a call on the talk group to access the specified sites. The system manager can then keep mobiles on specific sites even if the "Site Search" feature has not been enabled. The preference for each site can be programmed for Least, None, Preferred, or Always as follows.

The Preferred Site Lists are programmed by the System Preferred Site List screen described on page 64. Up to 16 lists can be programmed, and each site can include up to 16 sites.

If both a Preferred Site List and one or more Preferred Sites (selected at bottom of screen) are associated with a talk group, the Preferred Sites at the bottom are searched first. The first entry found for a given site is used. If the same site is in both lists, the entry in the list at the bottom of the screen is used first.

Use Sys Preferred Site List* - When this box is checked, the talk group is associated with a Preferred Site List. The specific site list is selected by the drop down list.

 Site Lists - Displays the Preferred Site List screen described on page 64 as a quick reference to

determine which sites are included in each site list. This screen is for informational purposes only, so lists can be viewed but not be edited. Clicking the "Select into Talk Group" button in this screen sets the "List To Use" field in the main screen to the selected list.
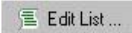
Talk Group Specific Preferred Sites - Up to four individual sites can also be associated with each talk group (see preceding information). Sites are enabled using the checkbox, and the following information is programmed for each site:

RFSS/Site ID No. - Designate a controller/site to which the talk group is allowed to roam.

Preference - Least, None (no preference), Preferred, or Always (preferred) is a weighting for steering to different sites.

Announcement Group List
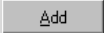
The Announcement Group List screen which follows sets up P25 Trunking announcement groups that are used to communicate with several talk groups simultaneously. Each announcement group can have up to 15 talk groups.

To display this screen, on the P25 Trunking Per System screen, select the Announcement Group List in the drop-down list and then click the Edit List ... button (see Figure 9-1).

Group ID - This list displays the Announcement group IDs currently contained in the Announcement

Group list. To edit an ID in this list, select it and then change it in the Selected Group box. This is the actual ID of the announcement group. Announcement groups are assigned to channels in the Zone screen (see page 65). *NOTE: This ID can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.*

Add - Clicking this button adds the next available announcement group ID to the list. Each P25 Trunked system can be programmed with up to 255 announcement groups.

To add an entire block of announcement group IDs or a specific ID, click the arrow button >> in the lower right corner of the screen. The following screen is then displayed. Refer to the preceding "Talk Group List" description for more information on this screen.

Add Mode
Multiple

Multiple Add
Start ID: 1 (D)
ID Count: 2
ID Step: 1

Delete - Clicking this button deletes the announcement group that is currently selected in the list.

Security Parameters - Programs the secure communication operation on each announcement group similar to talk groups described in the preceding "Talk Group List" description.
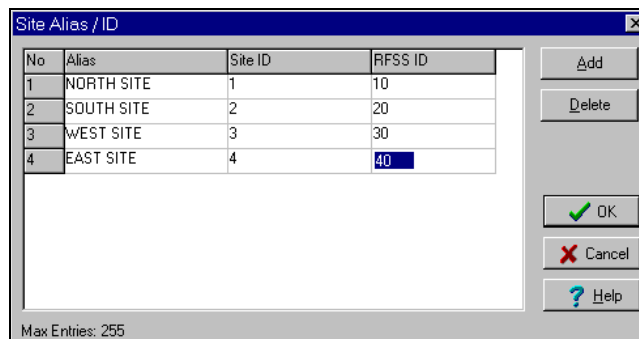
Use System Preferred Site List* - Selects one of the preferred sites for the announcement group. Refer to the preceding "Preferred Sites" description for more information.

Preferred Sites - Programs the preferred site information similar to talk groups described in the preceding "Talk Group List" description. Up to four Preferred

Sites and/or a Preferred Site List a can be associated with each announcement group. Refer to the preceding Talk Group List description for more information.

Talk Group ID - Selects the talk groups that are included in each announcement group.

Site List
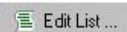
Sites in a P25 Trunking system are designated by a site number and RF subsystem (RFSS) number. The Site List screen shown above programs an alias for each site that is displayed when using the Site Search feature.

To display the preceding screen, on the P25 Trunking Per System screen, select Site List in the drop-down list and then click the Edit List ... button (see Figure 9-1).
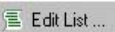
To add an alias, click the Add button to display the Add Alias/ID screen, and to delete an alias, simply select it and click the Delete button. To edit an alias or ID, simply select it and make the desired changes.

Alias - Programs up to 10 alphanumeric characters that identify the site.

Site ID - Site ID from 0-48.

RFSS ID - ID from 0-254 of the site controller that will be used.
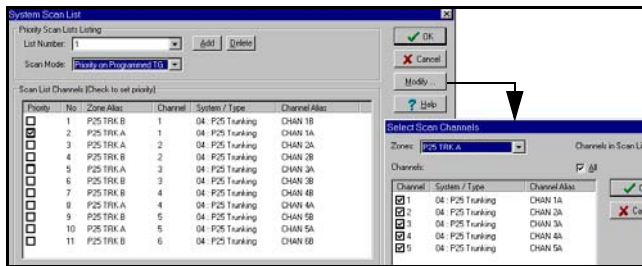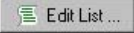
Priority Scan List

NOTE: Before the priority monitor scan lists can be programmed as follows, the channels to be included in these lists must be set up in the Zone screen as described in Section 9.3 on page 65.

The Priority Scan List screen shown above sets up the Priority (Standard) Scan lists that can be programmed on each P25 Trunking system. Each scan list can include up to 16 channels, one of which may be a priority channel. These channels must be from the same P25 Trunking system. Channels from other systems are not allowed. Up to as many lists can be programmed as can be stored in the available memory.

To display this screen, on the P25 Trunking Per System screen, select Priority Scan List in the drop-down list and then click the [🗏 Edit List ...] button (see Figure 9-1).

List Number - This drop-down list selects the scan list to edit. Click the "Add" button to add a scan list and "Delete" to delete a scan list.

[Modify ...] - Clicking this button displays the screen shown on the right above which is used to edit the selected scan list. Check the channels in each zone to be included in the selected scan list. Repeat for the other scan lists if applicable.

Scan Mode - If priority scan is used on a list, select "Priority on Selected" (51xx/53xx only) or "Priority on Programmed" from the drop down list. If priority scanning is not used, select "Non Priority Scan". If "Priority on Programmed" is selected, check the box of the desired priority channel.

NOTE: Priority talk group scanning must also be supported at the system level for it to occur as programmed. Talk Groups programmed as "Priority"

in PCConfigure must also be designated as Priority Monitor Groups by the System Control software.

System Preferred Site List

The Preferred Site List screen which follows programs up to 16 Preferred Site Lists. These lists can be associated with individual talk groups on the Talk Group List screen described starting on page 61. This forces calls on a talk group to access specific sites. The preference for each site in a list can be set for Least, None, Preferred, or Always as follows.

Each list can be programmed with up to 16 sites. Therefore, the use of Preferred Site Lists allows up to 16 sites to be associated with a group instead of just 4 available on the Talk Group List screen. In addition, if several talk groups are associated with the same sites, a list can simply be selected instead of separate sites.

Site Lists - This drop down list selects the list to be edited. To add a new list, click the "Add" button. To delete the selected list, click the "Delete" button.

Sites In List - To add/delete a site from the list, click the checkbox.

Site ID - Enter the site ID from 0-48.

Preference - Select the site preference in the drop down list. A default weighting is usually assigned to these preference levels which results in the most preference given to "Always" and the least preference to "Least" as follows:

1. Always (preferred)
2. Preferred
3. None (no preference)
4. Least (preferred)

User Group ID List*

This User Group ID List screen which follows programs aliases that can be displayed if a call is received on a talk group ID within the programmed

block. For example, with the preceding screen, if a group call is received on group IDs 234-264, the alias "Fire" can be displayed. The display of this alias is controlled by the "User Group ID" parameter on the Radio Wide screen.
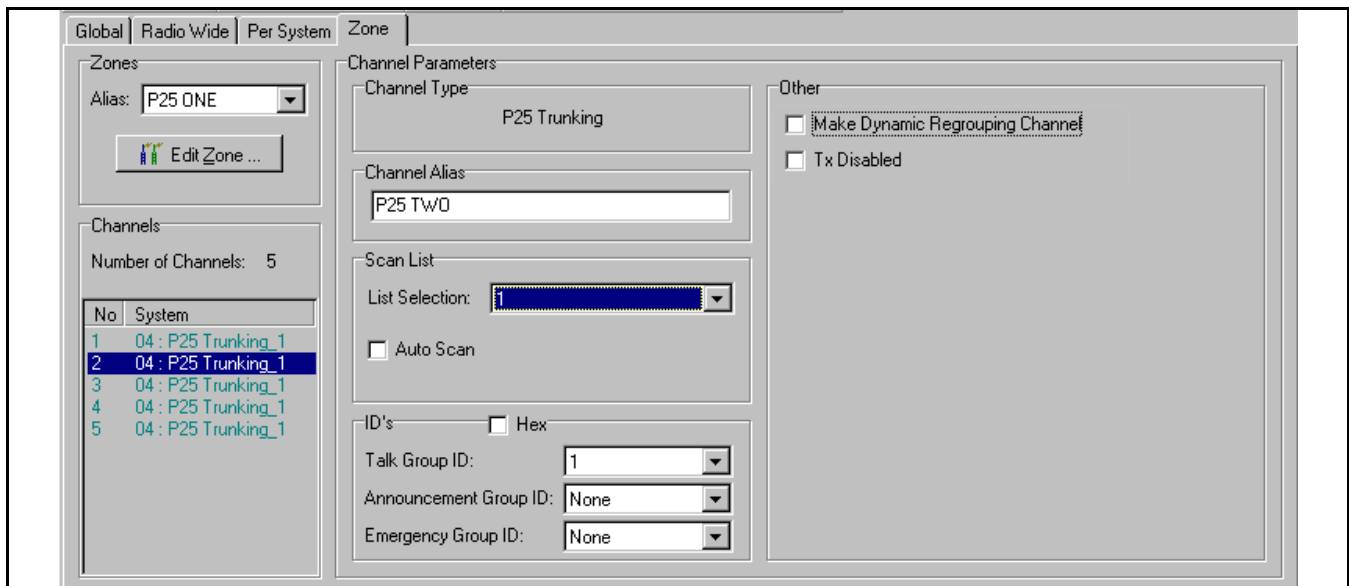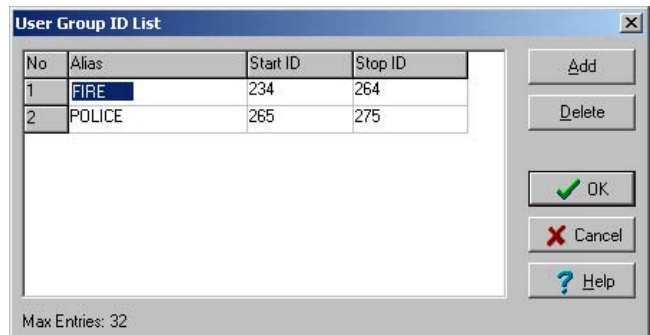
Figure 9-2   P25 Trunked Channel Screen

9.3 P25 TRUNKED CHANNEL PARAMETERS

After the desired channels have been set up as described in Section 6.3, individual channel parameters can be programmed. Select the Zone screen shown in Figure 9-2 and then select the desired Zone using the drop-down list in the "Zones" box. Screens which program individual channel parameters are selected by clicking the channel in the "Channels" box.

The parameters displayed when a P25 Trunking channel is selected are as follows. Conventional and

SMARTNET/SmartZone Trunked channels are described in Sections 7 and 8.

Channel Parameters

Channel Type - Indicates the type of channel (Conventional Analog, Conventional Digital, SMARTNET/SmartZone, Project 25 Trunked) that is currently selected in the "Channels" box.

Channel Alias - Programs the alias (identification) that is displayed when the channel is selected. Up to ten characters can be programmed.

* This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

Scan List - Selects the priority (standard) scan list selected by the channel. If "No List" is selected, scanning is not selectable on that channel.

Auto Scan - When this is checked, the radio automatically begins scanning the scan list associated with the channel whenever the channel is selected. When it is not checked, scanning must be started manually by the Scan option switch.

IDs

The possible combinations of Talk Groups (TGs) and Announcement Groups (AGs) provide the following operation:

Talk Group Only - Transmit on TG, receive on TG.
Announcement Group Only - Transmit on AG, receive on all TGs in AG.
Talk and Announcement Groups - Tx on TG and rx on TG plus AG but not the TGs assigned to the AG.

NOTE: These IDs can be entered in either the decimal or hexadecimal format as described in Section 1.9.4.

Talk Group ID - Selects the talk group selected by that channel. Talk Groups are programmed by selecting "Talk Group List" on the Per System screen (see page 61).

Announcement Group ID - Selects the announcement group selected by that channel. Announcement Groups are programmed by selecting "Announcement Group List" on the Per System screen (see page 62).

Emergency Group ID - Selects the talk group used for emergency calls on the channel.

Other

Make Dynamic Regrouping Channel - Checking this box designates the channel as the dynamic regrouping channel. The talk group is then programmed over the air, so the Talk Group ID and Announcement Group ID are not programmable.

Dynamic Regrouping must be enabled on the System screen to program a dynamic regrouping channel. The dynamic talk group does not need to be a programmed group.

Transmit Disable* - When this feature is checked, transmitting is disabled on the channel, and it can be used for monitoring only.

* This feature available only in 51xx models with code 1.12.1/2.2.1/3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

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SECTION 10   PASSWORD DESCRIPTION

10.1 NEW PASSWORD ENHANCEMENTS

10.1.1 INTRODUCTION

NOTE: Passwords are not available with the 7780 portable and 9883 mobile.

A new enhanced password feature is now available for 5100 portables and 5300 mobiles. The number of passwords have been increased along with the number of functions that can be under password control. The single Power-On password has been replaced by the following passwords:

- **Four Power-On (User x) Passwords**

- **Download and Upload Passwords**

- **Master Password**

10.1.2 SOFTWARE VERSIONS REQUIRED

The following revised PCConfigure and radio software is required for these new enhanced password features:

PCConfigure - Version 1.21.8 or later

5100 Portable

Version 1.x Models - 1.12.1 or later
Version 2.x Models - 2.2.1 or later
Version 3.x Models - 3.2.1 or later

5300 Mobile

Version 1.x Models - 1.24.1 or later ARM
Version 2.x Models - 2.2.1 or later
Version 3.x Models - 3.2.1 or later

NOTE: Refer to Section 16 for more information on the preceding radio firmware versions.

10.1.3 AVAILABILITY WITH EARLIER VERSIONS

The Power-On password feature available with earlier versions of radio firmware is no longer programmable using the latest versions of PCConfigure (1.21.2.8 or later). To program that feature in earlier radio models, an earlier version of the PCConfigure software must be used. It is programmed using the "Password at Power Up" function on the Global screen.

Otherwise, PCConfigure 1.21.2.8 or later can be used to program earlier radio models with the limitation that any new features which require updated firmware are not available.

10.2 PROGRAMMING PASSWORDS

10.2.1 GENERAL

With new versions of PCConfigure, the "Password at Power Up" parameter has been removed from the Global screen as just described. Passwords are now programmed using a password management screen displayed by the Tools > Password Management menu (see Section 3.4). The applicable radio must be connected to the computer and powered up to display this screen.

Password data is transferred and stored in an encrypted format for security purposes. In addition, actual passwords are never displayed. They are always indicated by eight asterisks (********). Therefore, it is not possible to determine what passwords are in a radio using the PCConfigure software.

Passwords must be 1-8 characters in length and consist of the numbers 0-9. Zeros are valid characters in any location, even as leading characters. Initially, all passwords are null (deleted) characters. Therefore, when initially programming a password, no entry is required in the "Original/Master Password" box.

10.2.2 LOST PASSWORDS

If a password is lost, it can be changed using PCConfigure by entering the Master password (see following). If even the Master password is lost or was not used, all passwords (and other radio programming) can be erased using the PCTune software as follows:

1. With PCTune 1.1.1.0 or later, simply select Radio > Reset Passwords.

2. With earlier versions of PCTune, after starting the PCTune program, press SHIFT CTRL E to toggle the following Erase EEPROM function (otherwise it is grayed and not selectable). Then Select Radio > Erase EEPROM > Params Only. *NOTE:* ***DO NOT SELECT "COMPLETE"*** *because that erases all information and the radio must then be sent back to the factory to make it usable again.*

10.2.3 CHANGING PASSWORD

An assigned password can be changed by the user if the "Set User Password" option button or menu parameter (5100 only) is programmed. Selecting this function displays prompts for entering and confirming a new password.

NOTE: With the 5100 portable and 5300 Handheld Control Unit, it is recommended that a number key not be used for this function because the password mode is exited if that key is pressed to enter a number.

10.2.4 PASSWORD ENTRY PROCEDURE

Whenever a password is requested, it is entered as follows:

53xx Mobile - Rotate and press the Select switch.

51xx Portable - With DTMF keypad models, enter each number using the keypad and press the F2 (Enter) key after the last digit is entered. With limited keypad models, enter each number by pressing the Up/Down switch and press the F2 key after each digit.

10.3 PASSWORD DESCRIPTION

10.3.1 USER (POWER-ON) PASSWORDS

When a User Password is enabled, it must be entered each time radio power is turned on. Up to four different User Passwords (User 1/User 2/User 3/ User 4) can be programmed. Currently, the same radio features are enabled for each. Entering any User Password at power up enables normal radio operation.

10.3.2 DOWNLOAD/UPLOAD PASSWORDS

Separate Download (write) and Upload (read) passwords can be programmed to prevent unauthorized downloading or uploading of radio programming parameters (see Section 3.3). When one or both of these passwords are used, the proper password must be entered to perform the operation. A "User" password is not required to upload or download parameters.

10.3.3 MASTER PASSWORD

The Master Password overrides all the preceding passwords. It can be used by a system administrator as a "pass key" to a password controlled function or to change a lost or inadvertently changed password. Master passwords are set up and changed the same as the other passwords. It does not override the following Zone Password.

10.4 ZONE PASSWORD

NOTE: The programming and usage of this password has not changed. It is independent from the preceding passwords, and programmed in the Zone > Edit Zones and Channels screen.

A zone password can also be programmed with the 53xx mobile and 51xx portable. It prevents unauthorized reprogramming of zones by keypad programming. When this password is used, it must be entered before system or channel parameters in that zone can be changed. The zone password is programmed in the Edit Zones and Channels screen. This screen is displayed by clicking the Edit Zone button on the Zone screen (see Section 6.2).

A different password can be programmed for each zone. When a password protected zone is selected, "PASSWORD" is flashed the first time an attempt is made to select a system or channel parameter in that zone. Each digit of the password is then entered as previously described. The password is always eight digits long, and after the eighth digit is entered, system and channel parameters for that zone can be reprogrammed normally.

SECTION 11   KEYPAD PROGRAMMING (53xx MOBILE)

11.1 INTRODUCTION

NOTE: Keypad programming is permitted by Federal Government users only. It is not permitted by any user regulated by the FCC (Federal Communications Commission). Radios with ARM code 1.22.0 or later require that the Keypad Programming option be factory enabled to program this feature (see Section 3.3).

Since keypad programming is permitted by Federal Government users only, only Federal models of this transceiver can be programmed with this feature. It is then available if a conventional mode option switch is programmed for the "Keypad Programming" function.

Keypad programming is then selected by simply pressing this switch (password entry is not required). The keypad programming mode is indicated by "CHNG ZONE" and a triangle in the display as follows:

```
 ▲
CHNG ZONE
```

Keypad programming allows conventional channel parameters such as the transmit and receive frequency and Call Guard squelch code to be changed. In addition, several conventional mode timers can be changed. It cannot be used to reprogram disabled channels or P25 Trunked and SMARTNET/SmartZone information.

11.2 MENU DESCRIPTION

A menu system is used to select parameters to be changed in the keypad programming mode. Rotate and press the Select switch to scroll through and select the available parameters. The available parameters and the section in which each is described are as follows:

- **CHNG ZONE (11.3)**
- **CHNG CHAN (11.4)**
- **SYS PARMS (11.5)**
- **CHAN PARMS (11.6)**

Press the Select switch to select the displayed parameter. Press the Keypad Programming option switch from one of the main menus to exit keypad programming or from another menu to exit back one level. Pressing it in the other menus returns to the previous menu. A flowchart showing the keypad programming mode menu structure is located below.

Figure 11-1   53xx Keypad Programming Menu Flowchart

11.3 ZONE CHANGE PARAMETER

The "CHNG ZONE" menu parameter selects the zone containing the conventional channel to be reprogrammed. It does not change the zone selected for normal operation.

Press the Select switch to select the "CHNG ZONE" parameter and then scroll through the programmed zones by rotating that switch. When the desired zone is displayed, select it by pressing the Select switch.

11.4 CHANNEL CHANGE PARAMETER

The "CHNG CHAN" menu parameter selects the conventional channel to be reprogrammed. Disabled or P25 Trunked/SMARTNET/SmartZone channels cannot be selected. This does not change the channel selected for normal operation.

Press the Select switch to select the "CHNG CHAN" parameter and then scroll through the

programmed channels by rotating that switch. When the desired channel is displayed, select it by pressing the Select switch.

11.5 SYSTEM PARAMETERS

NOTE: If "ENTER PSWD" is briefly displayed when attempting to select one of the following parameters, the zone password must be entered before changes can be made. Refer to Section 10.4 for more information.

The "SYS PARMS" menu parameter selects the conventional mode timer to be reprogrammed (see following). Press the Select switch to select the "SYS PARMS" parameter and then rotate that switch to display the desired parameter. Then press the Select switch again to select it.

SCAN TIMER - Selects the Scan Hold timer. Rotate the Select switch to decrement/increment the timer in 0.5-second steps ("0" disables it). When the desired value is displayed, store it by pressing the Select switch.

TX TIMER - Selects the transmit time-out timer. Rotate the Select switch to decrement/increment the timer in 15-second steps ("0" disables it). When the desired value is displayed, store it by pressing the Select switch.

PEN TIMER - Selects the penalty timer. Rotate the Select switch to decrement/increment the timer in 15-second steps ("0" disables it). When the desired value is displayed, store it by pressing the Select switch.

CONV TIMER - Selects the conversation timer. Rotate the Select switch to decrement/increment the timer in 30-second steps ("0" disables it). When the desired value is displayed, store it by pressing the Select switch.

11.6 CHANNEL PARAMETERS

NOTE: If "ENTER PSWD" is briefly displayed when attempting to select one of the following parameters, the zone password must be entered before changes can be made. Refer to Section 10.4 for more information.

The "CHAN PARMS" menu parameter selects the following conventional channel parameters that

can be reprogrammed. Press Select switch to select the "CHAN PARMS" parameter and then rotate that switch to display the desired parameter. Then press the Select switch again to select it.

NOTE: If a mixed mode channel is selected, both the Rx Code (analog) and Rx NAC (P25) which follow can be programmed. In addition, if the Tx Type which follows is Analog, a Tx Code is programmed, and if it is Digital (P25), a Tx NAC is programmed.

RX FREQ - Sets the receive channel frequency. To select the digit to change or move the cursor to the right, press the Select switch. Then to display the desired digit, rotate the Select switch. The frequency is stored after programming the last digit. If an invalid frequency is entered, a beep sounds, "INVALID" is briefly displayed, and the frequency editing mode continues to be selected.

TX FREQ - Selects the transmit frequency the same as RX FREQ above.

Squelch Control (Analog Channel)

RX CODE - Sets the receive Call Guard (CTCSS/ DCS) code. Rotate the Select switch to select the desired type (CTCSS and DCS). Then press and rotate the Select switch to select the desired code. The displayed code is stored after the last digit is programmed. If an invalid code is entered, a beep sounds, "INVALID" is briefly displayed, and the editing mode continues to be selected.

TX CODE - Selects the transmit codes the same as RX CODE above.

Squelch Control (Project 25 Channel)

RX NAC - Selects the Network Access Code (NAC) which can be any number from 0-4095. Rotate and press the Select switch to enter the desired code. The displayed code is stored after the last digit is programmed. If an invalid code is entered, a beep sounds, "INVALID" is briefly displayed, and the NAC editing mode continues to be selected.

TX NAC - Selects the transmit NAC the same as RX NAC above.

TX POWER - Selects the desired power output level. Rotate the Select switch to scroll through the following choices. When the desired setting is displayed, store it by pressing the Select switch.

- POWER HI - High transmit power
- POWER LO - Low transmit power
- POWER SW - Switchable power selectable by the High/Low power switch. This choice is not available if that switch is not programmed.

TX TIMER - Enables or disables the time-out timer on the current channel. Rotate the Select switch to toggle between the on and off mode, and when the desired setting is displayed, store it by pressing the Select switch.

CHAN SPACE (Analog Only) - Selects either wide or narrow band channel spacing on analog channels only. Rotate the Select switch to toggle between "WIDE" and "NARROW", and when the desired

setting is displayed, store it by pressing the Select switch.

SQ ADJUST (Analog Only) - Changes the preset squelch setting on that channel. The default setting is "0" and values of –7 to +7 can be selected. Increasing this setting toward +7 causes the squelch to open sooner so that weaker signals can be received, and decreasing it toward –7 causes the opposite to occur.

TG ID (P25 Only) - Selects the talk group for the selected channel. Rotate the Select switch to display the alias of each preprogrammed talk group and then press it to store the desired talk group.

Transmit Type (P25 Mixed Mode Only) - If the selected channel is a mixed mode, analog and P25 channel, this selects the transmit type. Either Analog or Digital (P25) can be selected. This then determines if a Tx Code or Tx NAC is programmed above.

SECTION 12   KEYPAD PROGRAMMING (51xx PORTABLE)

12.1 INTRODUCTION

NOTE: Refer to Section 11.1 for information regarding the restricted availability of keypad programming.

Keypad programming is available if a conventional mode option switch or menu parameter is programmed for the "Keypad Programming" function. It is then selected by simply pressing that switch or selecting that menu parameter. The keypad programming mode is indicated by "CHNG ZONE" and 🎮 in the display.
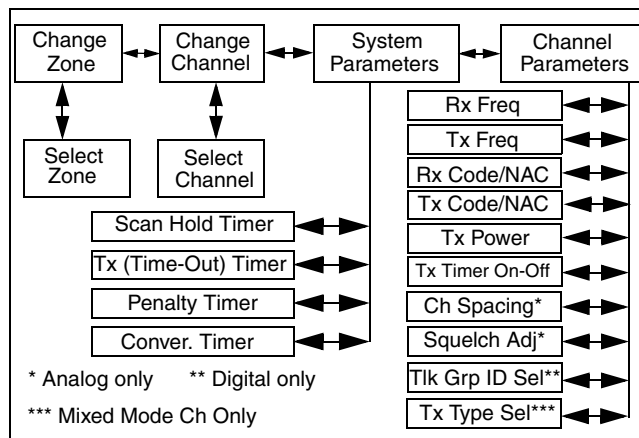
Keypad programming allows conventional channel parameters such as the transmit and receive frequency and Call Guard squelch code to be changed. In addition, several conventional mode timers can be changed. It cannot be used to reprogram disabled channels or any P25 Trunked and SMARTNET/Smart-Zone information.

12.2 MENU DESCRIPTION

A menu system is used to select parameters to be changed in the keypad programming mode. A
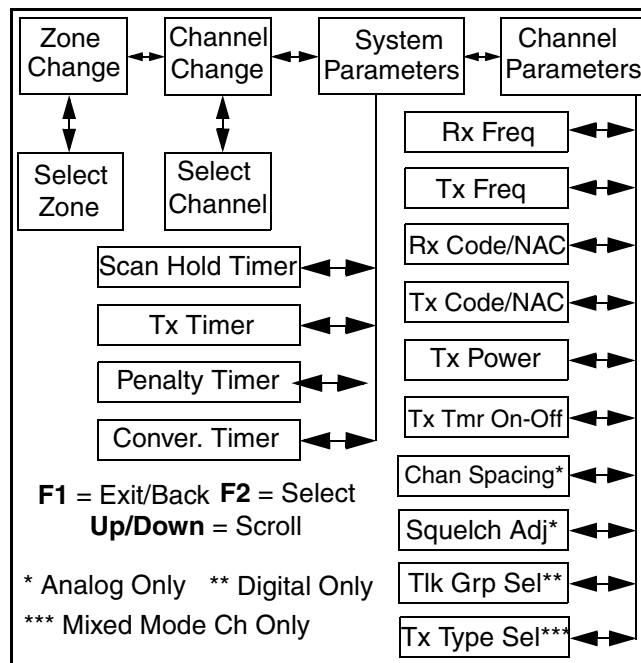
Figure 12-1   51xx Keypad Programming Menu Flowchart

flowchart showing the keypad programming mode menu structure is located in Figure 12-1. When the keypad programming mode is selected by the Keypad Programming option button or menu parameter, the first menu parameter "CHNG ZONE" is displayed as just described. Press the Up/Down switch to scroll through the available parameters which are listed below.

- **CHNG ZONE (12.3)**
- **CHNG CHAN (12.4)**
- **SYS PARMS (12.5)**
- **CHAN PARMS (12.6)**

Press the F2 (Select) key to select a highlighted parameter, and press the F1 key from one of the main menus to exit keypad programming. Pressing it in the other menus returns to the previous menu. Additional information on this parameters is located in the following sections.

12.3 ZONE CHANGE PARAMETER

General

The "CHNG ZONE" menu parameter selects the zone containing the conventional channel to be reprogrammed. It does not change the zone selected for normal operation.

Press the F2 switch to select the "ZONE CHG" parameter and then scroll through the programmed zones by pressing the Up/Down switch. When the desired zone is displayed, select it by pressing the F2 switch.

12.4 CHANNEL CHANGE PARAMETER

The "CHNG CHAN" menu parameter selects the conventional channel to be reprogrammed. Disabled or P25Trunked/SMARTNET/SmartZone channels cannot be selected. This does not change the channel selected for normal operation.

Press the Select switch to select the "CHNG CHAN" parameter and then scroll through the programmed channels by pressing the Up/Down switch. When the desired channel is displayed, select it by pressing F2 switch.

12.5 SYSTEM PARAMETERS

NOTE: If "PASSWORD" is briefly displayed when attempting to select one of the following parameters, the zone password must be entered before changes can be made. Refer to Section 10.4 for more information.

The "SYS PARMS" menu parameter selects the conventional mode timers to be reprogrammed (see following). Press the F2 switch to select the "SYS PARMS" parameter and then press the Up/Down switch to display the desired parameter. Then press the F2 switch again to select it.

SCAN TIMER - Selects the Scan Hold timer. Press the Up/Down switch to decrement/increment the timer in 0.5-second steps or set it to 0 seconds to disable it. When the desired value is displayed, store it by pressing the F2 switch.

TX TIMER - Selects the transmit time-out timer. Press the Up/Down switch to decrement/increment the timer in 15-second steps or disable it by selecting 0 seconds. When the desired value is displayed, store it by pressing the F2 switch.

PEN TIMER - Selects the penalty timer. Press the Up/Down switch to decrement/increment the timer in 15-second steps. When the desired value is displayed, store it by pressing the F2 switch.

CONV TIMER - Selects the conversation timer. Press the Up/Down switch to decrement/increment the timer in 30-second steps or disable it by selecting 0 seconds. When the desired value is displayed, store it by pressing the F2 switch.

12.6 CHANNEL PARAMETERS

NOTE: If "PASSWORD" is briefly displayed when attempting to select one of the following parameters, the zone password must be entered before changes can be made. Refer to Section 10.4 for more information.

The "CHAN PARMS" menu parameter selects the following conventional channel parameters that can be reprogrammed. Press F2 switch to select the "CHAN PARMS" parameter and then press the Up/Down switch to display the desired parameter. Then press the F2 switch to select it. The squelch

control parameters are unique to the type of conventional channel selected (analog or Project 25).

NOTE: If a mixed mode channel is selected, both the Rx Code (analog) and Rx NAC (P25) which follow can be programmed. In addition, if the Tx Type which follows is Analog, a Tx Code is programmed, and if it is Digital (P25), a Tx NAC is programmed.

RX FREQ - Programs the receive channel frequency. The digit being changed flashes, and press the Up/Down switch to select the desired number for that digit. Then press the F2 switch to move to the next digit. If an invalid frequency is entered, a beep sounds, "INVALID" is briefly displayed, and the number must be re-entered.

TX FREQ - Programs the transmit frequency the same as RX FREQ above.

CTCSS/DCS Squelch Control (Analog Channel)

RX CODE - Programs the receive Call Guard (CTCSS/DCS) code. The currently selected code and is initially displayed. Press the Up/Down switch to select the desired code type (CTCSS analog or DCS digital Call Guard). Then press F2 to select it and enter the code number similar to programming a channel frequency as just described.

TX CODE - Selects the transmit codes the same as RX CODE above.

NAC Squelch Control (Project 25 Channel)

RX NAC - Programs the Network Access Code (NAC) which can be any number from 0-4095. The procedure is similar to programming a RX FREQ just described. If an invalid code is entered, a beep sounds, "INVALID" is briefly displayed, and the code must be re-entered.

TX NAC - Selects the transmit NAC the same as RX NAC above.

TX POWER - Selects the desired power output level. Press the Up/Down switch to scroll through the following choices. When the desired setting is displayed, store it by pressing the F2 switch.

- POWER HI - High transmit power
- POWER LO - Low transmit power
- POWER SW - Switchable power selectable by the High/Low power switch. This choice is not available if that switch is not programmed.

TX TIMER - Enables or disables the time-out timer on the current channel. Press the Up/Down switch to select the on and off mode, and when the desired setting is displayed, store it by pressing the F2 switch.

CHAN SPC (Analog Only) - Selects either wide or narrow band channel spacing on analog channels only. Press the Up/Down switch to select "WIDE" or "NARROW", and when the desired setting is displayed, store it by pressing the F2 switch.

SQ ADJ (Analog Only) - Changes the preset squelch setting on that channel. The default setting is "0" and values of –7 to +7 can be selected. Increasing this setting toward +7 causes the squelch to open sooner so that weaker signals can be received, and decreasing it toward –7 causes the opposite to occur.

TG ID (P25 Only) - Selects the talk group for the selected channel. Press the Up/Down switch to display the alias of each preprogrammed talk group and then press F2 to store the desired talk group.

Transmit Type (P25 Mixed Mode Only) - If the selected channel is a mixed mode, analog and P25 channel, this selects the transmit type. Either Analog or Digital (P25) can be selected. This then determines if a Tx Code or Tx NAC is programmed above.

SECTION 13   SYSTEM KEY

13.1 GENERAL

To program certain SMARTNET/SmartZone and Project 25 Trunking parameters, the proper System Key must be detected by PCConfigure. The System Key is provided by the EFJohnson Company to authorized users. It is not the same as the encryption (hardware) key, and it is not required to program conventional analog and conventional Project 25 parameters.

The parameters which are available only with the System Key are described in the following information. Other parameters associated with trunking, such as Zones and Channels, continue to be editable. If a System Key has no trunking parameters enabled, a default trunking system of "One" is assigned and disabled parameters are unavailable for assignment to this system even though the radio is trunking capable.

13.2 SYSTEM KEY LOCATION

The system key should be copied by the user to the "Keys" folder of the PCConfigure directory. This folder is automatically created when PCConfigure is installed. The default directory in which PCConfigure is installed is as follows. Some other location may also have been selected.

Program Files\EF Johnson\PCConfigure1_x.x.

The system key can also be loaded from other folders using the Radio > Load System Keys function. A dialog box is then displayed which allows the folder to be selected. When the program is restarted, either the "Keys" folder or the last selected folder is selected, depending on the Tools > Preferences programming (see Section 3.4).
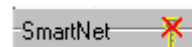
 - The yellow "Key" icon on the system screen (see Figure 8-1) indicates that a system key is present in this folder. If a system key is not present, this yellow key icon has a red "X" over it as

shown above and none of the following parameters can be programmed.

NOTE: If the red "X" is still displayed after a key is copied to the "keys" folder, it may be necessary to restart the PCConfigure program for it to recognize the key. In addition, be sure to select the new system ID contained in the key in the IDs > System drop down list on the Per System screen.

13.3 DISABLED SMARTNET/SMARTZONE PARAMETERS

The following SMARTNET/SmartZone parameters cannot be Added or Deleted without the proper System Key:

- System ID - Only the system IDs from available keys can be selected.
- Individual ID
- Control channels
- Talk groups
- Announcement groups
- Emergency groups
- Connect tone
- Splinter channel option

13.4 DISABLED PROJECT 25 TRUNKING PARAMETERS

The following Project 25 Trunked parameters cannot be Added or Deleted without the proper System Key (conventional analog and Project 25 parameters can still be edited).

- WACN ID
- Home system ID
- Site ID
- RFSS ID
- Individual ID
- Control channels
- Talk groups
- Announcement groups

SECTION 14   CLONING PROCEDURE (51xx ONLY)

14.1 INTRODUCTION

14.1.1 GENERAL

The Clone feature enables one radio to program another with identical information. The PCConfigure programming software is not required. This feature is available with 51xx portables only. Other requirements are as follows:

- The Clone menu parameter must be enabled in the master (sending) radio. This parameter is not required with the slave (receiving) radio.

- The master and slave radios must be identical models (same frequency range and options).

- Flash code Version 1.5.0/2.0.0/3.0.0 or higher is required with both radios (see Section 16.1). PCConfigure Version 1.17 or higher is required to program the Clone menu parameter.

Only zones with conventional analog and P25 channels can be transferred using this function. Any SMARTNET/SmartZone and P25 trunked information is not transferred. In addition, the P25 Unit ID, encryption keys, and the RSI ID and other OTAR information are not transferred. Cloned zones are indicated in the slave radio by an asterisk in the first character position of the zone alias (the first character is replaced by this asterisk).

14.1.2 WIRELESS CLONING

A new wireless cloning feature is available that allows one radio to program another using an RF link instead of having to be physically connected by a cloning cable. Only 5100 radios with the following firmware or later have this feature. Refer to Section 16.1 for more information on 5100 versions.

Version 1 Radio - 1.12.1 or later
Version 2 Radios - 2.2.1 or later
Version 3 Radios - 3.2.1 or later

The wireless cloning feature utilizes the P25 data functionality of the radio. Therefore, in both radios, a conventional P25 channel must be programmed and Data Registration must be enabled on the Per System

screen. The slave radio must also be programmed with a P25 Unit ID. Radios with wireless cloning capability have a new selection in the cloning menu to select either Clone N (Normal) or Clone W (Wireless). If Wireless is selected, and additional menu is displayed for entering the P25 Unit ID of the destination radio (slave). The Zone/Complete mode is then selected.

14.2 CLONING PROCEDURE

1. With normal (non-wireless) cloning, connect the master (sending) radio to the slave (receiving) radio using Cloning Cable, Part No. 023-5100-930.

2. On the master radio, select the Clone menu parameter and press the F2 key. If applicable, select either "Clone W" (Wireless) or "Clone N" (Normal). If normal cloning was selected or if this is not selectable, proceed to step 4.

3. With wireless cloning, a screen is then displayed for entering the P25 Unit ID of the destination (slave) radio. Enter this ID using the keypad (or the Up/Down keys) and F2.

4. The clone mode "Zone" or "Complete" is then selected. Select the desired mode. Operation is as follows:

Zone - This mode allows channel information for only the selected zone to be transferred. Information programmed on the Global, Radio Wide, and By System screens is not changed. A list of the current conventional zones is displayed. Select the desired zone by highlighting it and pressing the F2 key. A selected zone is indicated by an asterisk (*). Scroll to "OK" and press F2 to begin the data transfer. The selected zone in the slave radio is overwritten. Previously, multiple zones could be selected and they were appended to those in the slave radio.

Complete - This mode transfers all conventional programming information. This includes information on the Global, Radio Wide, and By System screens. Simply highlight "Complete" and press the F2 key to begin the data transfer. This mode overwrites all this information currently in the slave radio. None of the previous information is retained except for the IDs as described in Section 14.1.1.

SECTION 15   ANTI-CLONING FEATURES

NOTE: The information which follows refers to copying of parameters from one radio to another using the PCConfigure software. It is not referring to cloning using two radios described in the preceding section.

15.1 INTRODUCTION

The latest releases of 5100 and 5300 radio and PCConfigure software include safeguards to prevent unauthorized cloning of radios programmed for trunked operation using the PCConfigure software. The trunked operating modes are SMARTNET, Smart-Zone, and P25 Trunking.

Many trunking parameters are restricted and can be programmed or edited only with the correct System Key as described in Section 13. These new safeguards prevent another radio from being cloned with restricted trunking information without the correct System Key.

15.2 SOFTWARE VERSIONS

The following programmer and radio software releases support these new cloning safeguards:

PCConfigure - Version 1.20 or later
5100 Portable - Flash Code Ver 1.9.0/2.0/3.0 or higher
5300 Mobile - Flash Code Version 2.0/3.0 or higher;
   ARM Code Version 1.22.0 or higher (early models).

The new version of PCConfigure (1.20 or later) is required to program all 51xx/53xx radios with the above software. The new PCConfigure software can also be used to program radios with earlier software. However, 51xx/53xx radios with the earlier software do not support the new cloning safeguards. The 7780 and 9883 models always require the correct System Keys to write information to the radio.

15.3 DESCRIPTION OF CHANGES

All programming files uploaded from a radio with the new version of PCConfigure will now include information on the specific radio from which it was read (uploaded). The ESN (Electronic Serial Number) and other information is stored in an encrypted form in the data file. This information is also included with file when it is saved to disk, if applicable. Other operation with these changes is as follows:

Saving a New File

NOTE: It is no longer possible to save any type of new programming file to disk without a radio connected.

All files saved to disk must now be associated with a specific radio. Therefore, when saving a new file for the first time, the radio must connected to the computer so the ESN and other information can be read and stored with the file. However, a previously saved disk file can be opened and edited and then re-saved to disk without a radio connected. In addition, files containing trunking parameters can be saved without the proper system key.

Writing a File To Radios Containing New Software

Correct System Key Available - A file with trunking parameters can be edited as desired and written to any radio.

Correct System Key Not Available - Restricted trunking parameters cannot be changed (see Section 13). However, non-restricted trunking and conventional parameters can still be changed. The data file can be written to the same radio only. If it is written to a different radio, the data is scrambled and "Params Fail" is displayed by the radio when programming is finished.

File Containing Only Conventional Parameters (P25 or Analog) - There are no editing restrictions and data files can be written to any radio.

Radios With Earlier Software

When a file write operation is initiated, the PCConfigure software checks the software version of the radio. If it is an earlier version than is listed in Section 15.2, the file is written regardless of the System Key or the source radio of the data file.

Using Earlier Versions of PCConfigure

As described in Section 15.2, Version 1.20 or later PCConfigure must be used to program radios with the new software. This applies to both conventional and trunked operation. Improper operation results if earlier versions are used.

SECTION 16   51xx/53xx FIRMWARE VERSIONS

Table 16-1   5100 Encryption Hardware Configurations

Radio Version [1]	**Application (Firmware) Code Base**	**Analog Channel Encryption**		**Digital Channel Encryption**	
		DES	**DES-XL**	**DES-OFB**	**AES**
Version 1 (No Module/Software Encryption) Current standard version which uses the -110 Logic board and -410 UI Board. Not FIPS approved.	1.xx	Yes	No	Yes	Yes
Version 2 (uses EFJ SEM module) New version which has the new EFJohnson SEM (Subscriber Encryption Module) on the logic board. This version uses the -150 Logic and -450 UI boards. All radios include the SEM, and the desired encryption options (if any) are enabled by factory programming. FIPS approved.	Initially same as above, then 2.xx	Yes	No	Yes	Yes
Version 3 (uses Motorola UCM module) New version which has the Motorola UCM (Universal Crypto Module) on the logic board. This version uses the -160 Logic and -460 UI boards, and is ordered when DES-XL encryption is required. FIPS approved.	3.xx	Yes	Yes	Yes	Yes
[1] *The version number is also indicated by the 13th digit of the radio part number (242-51xx-xxx-xxV).*					

16.1 51XX PORTABLE FIRMWARE VERSIONS

General

Beginning in October 2003, two new versions of the 51xx portable began shipping (Versions 2 and 3 in Table 16-1). These versions have new Logic and Universal Interface boards, and each uses different firmware (application code) that is not compatible with earlier or other models. The three radio versions now available are shown in Table 16-1.

Firmware Version Used

The firmware code base used by each of these three versions is shown in Table 16-1. This is operating code of the radio that may occasionally be updated using the "Transfer > Write Code To Radio"

function (see Section 3.3). For example, if firmware with new operating features or fixes is loaded into a Version 2 radio, it would have a 2.xx version number.

Initially, Version 2 radios used Version 1.11.9 code which was the same as that used with the Version 1 radios. However, later code releases for Version 2 radios are not compatible with Version 1 radios, so Version 2.xx code will be used.

NOTE: The code version (and therefore radio version) is briefly displayed when the radio powers up.

Programming Software Required

PCConfigure™ programming software, Version 1.21.0 or later is required to program radios with the Version 2 and 3 boards. This software can also be used to program radios with the earlier boards.

16.2 53XX MOBILE FIRMWARE VERSIONS

General

Beginning in November 2003, a revised logic board began shipping in 5300 models. This board utilizes a new control logic design similar to that used in the 5100 portable. This board is available in the following configurations. All versions are FIPS approved.

SEM Version - This version has the EFJohnson SEM (Security Encryption Module) soldered to the board. It is used whenever DES, DES-OFB, or AES encryption is required. It does not provide DES-XL encryption.

UCM Version - This includes a plug-in Motorola UCM encryption module. It is used whenever DES-XL Motorola proprietary encryption is required. It also provides DES, DES-OFB, or AES encryption.

No Encryption Version - If encryption is not required, either the earlier logic board (see following) or the UCM version without the UCM module is used.

Early Unrevised Logic Board

This version is Part No. 035-1800-4xx and is being replaced by the above versions. This board has a jack for plugging in Motorola encryption modules that provide DES/DES-XL/DES-OFB and AES encryption. It does not use the SEM module.

Programming Software Required

PCConfigure programming software, Version 1.21.2.5 or later is required to program radios with the revised board. This software can also be used to program radios with the unrevised board. The "5300" Radio Series is selected for both boards. The software automatically detects which board is used when parameters are written to the radio.

Firmware Required

Radios with the revised and unrevised logic boards use different firmware (operating/Flash software) as follows. When downloading code using the PCConfigure software (such as when purchasing new operating features), the radio must be powered up when the password is entered so that the logic board version can be detected.

Models with Revised Board - A single code file is used similar to the 5100 portable. SEM code has a 2.xx version number, and UCM code has a 3.xx version number.

Models with Unrevised Board - Two code files are used, one of which programs DSP parameters and the other which programs ARM processor parameters. These code sets have a 1.xx version number.

Identifying Radios With Revised Logic Board

Refer to the radio Serial Number on the label on the bottom cover to determine if it is a version with the revised logic board. Radios with the new revised logic board have a Revision Letter (letter following 53xx0) of "G" or higher. Radios with an A-F Revision Letter have the early unrevised -4xx logic board just described.

The board version can also be determined by noting the software version number that is briefly displayed when power is turned on. The version numbers are as follows:

Software Version Displayed	Board Version
Ver 1.xx	Early unrevised
Ver 2.xx	SEM version
Ver 3.xx	UCM version

SECTION 17   CALL GUARD (CTCSS/DCS) AND 800 MHz CHANNEL TABLES

Table 17-1   Call Guard (CTCSS/DCS) Codes

| Recommended Tone Call Guard Codes |

Code	Freq	Code	Freq	Code	Freq	Code	Freq	Code	Freq
		09	91.5	18	123.0	27	167.9	36*	233.6
01	67.0	10	94.8	19	127.3	28	173.8	37*	241.8
02	71.9	11**	97.4	20	131.8	29	179.9	38*	250.3
03	74.4	12	100.0	21	136.5	30	186.2	39**	69.3
04	77.0	13	103.5	22	141.3	31	192.8	40**	206.5
05	79.7	14	107.2	23	146.2	32	203.5	41**	229.1
06	82.5	15	110.9	24	151.4	33	210.7	42**	254.1
07	85.4	16	114.8	25	156.7	34*	218.1		
08	88.5	17	118.8	26	162.2	35*	225.7		

* These tones normally are not used because of their close proximity to the voice frequencies
** This tone is normally not used because it may cause interference with adjacent tones.

| Recommended Digital Call Guard Codes |

023	065	131	172	261	346	431	532	654	743
025	071	132	174	263	351	432	546	662	754
026	072	134	205	265	364	445	565	664	
031	073	143	223	271	365	464	606	703	
032	074	152	226	306	371	465	612	712	
043	114	155	243	311	411	466	624	723	
047	115	156	244	315	412	503	627	731	
051	116	162	245	331	413	506	631	732	
054	125	165	251	343	423	516	632	734	

SECTION 18   P25 PACKET DATA MODE

18.1 GENERAL

P25 packet data transmissions* are or soon will be available with 5100 portable and 5300 mobile radios. A P25 Packet Data option button or menu parameter (5100 only) is used to toggle the data mode.

The P25 Packet Data mode allows a subscriber unit to act as a packet data modem for a remote application connected to the subscriber unit via an RS-232 or SLIP (Serial Line Internet Protocol) connection. The SLIP connection requires an Ethernet port which is currently not available with either radio.

18.2 HARDWARE REQUIRED

18.2.1 5100 PORTABLE

The standard PCConfigure programming cable provides the RS-232 port (female DB9 connector) for connecting the external data equipment.

18.2.2 5300 MOBILE

A special data pigtail cable (Part No. 597-2002-282) is installed in the radio to provide external access to the RS-232 lines. This cable will also have a female DB9 connector for connecting the external equipment.

This feature available only in 51xx models with code 1.12.1/2.2.1/ 3.2.1 or later and 53xx models with code 1.24.1/2.2.1/3.2.1 or later.

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
1	851.0125	806.0125	51	852.2625	807.2625	101	853.5125	808.5125
2	851.0375	806.0375	52	852.2875	807.2875	102	853.5375	808.5375
3	851.0625	806.0625	53	852.3125	807.3125	103	853.5625	808.5625
4	851.0875	806.0875	54	852.3375	807.3375	104	853.5875	808.5875
5	851.1125	806.1125	55	852.3625	807.3625	105	853.6125	808.6125
6	851.1375	806.1375	56	852.3875	807.3875	106	853.6375	808.6375
7	851.1625	806.1625	57	852.4125	807.4125	107	853.6625	808.6625
8	851.1875	806.1875	58	852.4375	807.4375	108	853.6875	808.6875
9	851.2125	806.2125	59	852.4625	807.4625	109	853.7125	808.7125
10	851.2375	806.2375	60	852.4875	807.4875	110	853.7375	808.7375
11	851.2625	806.2625	61	852.5125	807.5125	111	853.7625	808.7625
12	851.2875	806.2875	62	852.5375	807.5375	112	853.7875	808.7875
13	851.3125	806.3125	63	852.5625	807.5625	113	853.8125	808.8125
14	851.3375	806.3375	64	852.5875	807.5875	114	853.8375	808.8375
15	851.3625	806.3625	65	852.6125	807.6125	115	853.8625	808.8625
16	851.3875	806.3875	66	852.6375	807.6375	116	853.8875	808.8875
17	851.4125	806.4125	67	852.6625	807.6625	117	853.9125	808.9125
18	851.4375	806.4375	68	852.6875	807.6875	118	853.9375	808.9375
19	851.4625	806.4625	69	852.7125	807.7125	119	853.9625	808.9625
20	851.4875	806.4875	70	852.7375	807.7375	120	853.9875	808.9875
21	851.5125	806.5125	71	852.7625	807.7625	121	854.0125	809.0125
22	851.5375	806.5375	72	852.7875	807.7875	122	854.0375	809.0375
23	851.5625	806.5625	73	852.8125	807.8125	123	854.0625	809.0625
24	851.5875	806.5875	74	852.8375	807.8375	124	854.0875	809.0875
25	851.6125	806.6125	75	852.8625	807.8625	125	854.1125	809.1125
26	851.6375	806.6375	76	852.8875	807.8875	126	854.1375	809.1375
27	851.6625	806.6625	77	852.9125	807.9125	127	854.1625	809.1625
28	851.6875	806.6875	78	852.9375	807.9375	128	854.1875	809.1875
29	851.7125	806.7125	79	852.9625	807.9625	129	854.2125	809.2125
30	851.7375	806.7375	80	852.9875	807.9875	130	854.2375	809.2375
31	851.7625	806.7625	81	853.0125	808.0125	131	854.2625	809.2625
32	851.7875	806.7875	82	853.0375	808.0375	132	854.2875	809.2875
33	851.8125	806.8125	83	853.0625	808.0625	133	854.3125	809.3125
34	851.8375	806.8375	84	853.0875	808.0875	134	854.3375	809.3375
35	851.8625	806.8625	85	853.1125	808.1125	135	854.3625	809.3625
36	851.8875	806.8875	86	853.1375	808.1375	136	854.3875	809.3875
37	851.9125	806.9125	87	853.1625	808.1625	137	854.4125	809.4125
38	851.9375	806.9375	88	853.1875	808.1875	138	854.4375	809.4375
39	851.9625	806.9625	89	853.2125	808.2125	139	854.4625	809.4625
40	851.9875	806.9875	90	853.2375	808.2375	140	854.4875	809.4875
41	852.0125	807.0125	91	853.2625	808.2625	141	854.5125	809.5125
42	852.0375	807.0375	92	853.2875	808.2875	142	854.5375	809.5375
43	852.0625	807.0625	93	853.3125	808.3125	143	854.5625	809.5625
44	852.0875	807.0875	94	853.3375	808.3375	144	854.5875	809.5875
45	852.1125	807.1125	95	853.3625	808.3625	145	854.6125	809.6125
46	852.1375	807.1375	96	853.3875	808.3875	146	854.6375	809.6375
47	852.1625	807.1625	97	853.4125	808.4125	147	854.6625	809.6625
48	852.1875	807.1875	98	853.4375	808.4375	148	854.6875	809.6875
49	852.2125	807.2125	99	853.4625	808.4625	149	854.7125	809.7125
50	852.2375	807.2375	100	853.4875	808.4875	150	854.7375	809.7375

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
151	854.7625	809.7625	201	856.0125	811.0125	251	857.2625	812.2625
152	854.7875	809.7875	202	856.0375	811.0375	252	857.2875	812.2875
153	854.8125	809.8125	203	856.0625	811.0625	253	857.3125	812.3125
154	854.8375	809.8375	204	856.0875	811.0875	254	857.3375	812.3375
155	854.8625	809.8625	205	856.1125	811.1125	255	857.3625	812.3625
156	854.8875	809.8875	206	856.1375	811.1375	256	857.3875	812.3875
157	854.9125	809.9125	207	856.1625	811.1625	257	857.4125	812.4125
158	854.9375	809.9375	208	856.1875	811.1875	258	857.4375	812.4375
159	854.9625	809.9625	209	856.2125	811.2125	259	857.4625	812.4625
160	854.9875	809.9875	210	856.2375	811.2375	260	857.4875	812.4875
161	855.0125	810.0125	211	856.2625	811.2625	261	857.5125	812.5125
162	855.0375	810.0375	212	856.2875	811.2875	262	857.5375	812.5375
163	855.0625	810.0625	213	856.3125	811.3125	263	857.5625	812.5625
164	855.0875	810.0875	214	856.3375	811.3375	264	857.5875	812.5875
165	855.1125	810.1125	215	856.3625	811.3625	265	857.6125	812.6125
166	855.1375	810.1375	216	856.3875	811.3875	266	857.6375	812.6375
167	855.1625	810.1625	217	856.4125	811.4125	267	857.6625	812.6625
168	855.1875	810.1875	218	856.4375	811.4375	268	857.6875	812.6875
169	855.2125	810.2125	219	856.4625	811.4625	269	857.7125	812.7125
170	855.2375	810.2375	220	856.4875	811.4875	270	857.7375	812.7375
171	855.2625	810.2625	221	856.5125	811.5125	271	857.7625	812.7625
172	855.2875	810.2875	222	856.5375	811.5375	272	857.7875	812.7875
173	855.3125	810.3125	223	856.5625	811.5625	273	857.8125	812.8125
174	855.3375	810.3375	224	856.5875	811.5875	274	857.8375	812.8375
175	855.3625	810.3625	225	856.6125	811.6125	275	857.8625	812.8625
176	855.3875	810.3875	226	856.6375	811.6375	276	857.8875	812.8875
177	855.4125	810.4125	227	856.6625	811.6625	277	857.9125	812.9125
178	855.4375	810.4375	228	856.6875	811.6875	278	857.9375	812.9375
179	855.4625	810.4625	229	856.7125	811.7125	279	857.9625	812.9625
180	855.4875	810.4875	230	856.7375	811.7375	280	857.9875	812.9875
181	855.5125	810.5125	231	856.7625	811.7625	281	858.0125	813.0125
182	855.5375	810.5375	232	856.7875	811.7875	282	858.0375	813.0375
183	855.5625	810.5625	233	856.8125	811.8125	283	858.0625	813.0625
184	855.5875	810.5875	234	856.8375	811.8375	284	858.0875	813.0875
185	855.6125	810.6125	235	856.8625	811.8625	285	858.1125	813.1125
186	855.6375	810.6375	236	856.8875	811.8875	286	858.1375	813.1375
187	855.6625	810.6625	237	856.9125	811.9125	287	858.1625	813.1625
188	855.6875	810.6875	238	856.9375	811.9375	288	858.1875	813.1875
189	855.7125	810.7125	239	856.9625	811.9625	289	858.2125	813.2125
190	855.7375	810.7375	240	856.9875	811.9875	290	858.2375	813.2375
191	855.7625	810.7625	241	857.0125	812.0125	291	858.2625	813.2625
192	855.7875	810.7875	242	857.0375	812.0375	292	858.2875	813.2875
193	855.8125	810.8125	243	857.0625	812.0625	293	858.3125	813.3125
194	855.8375	810.8375	244	857.0875	812.0875	294	858.3375	813.3375
195	855.8625	810.8625	245	857.1125	812.1125	295	858.3625	813.3625
196	855.8875	810.8875	246	857.1375	812.1375	296	858.3875	813.3875
197	855.9125	810.9125	247	857.1625	812.1625	297	858.4125	813.4125
198	855.9375	810.9375	248	857.1875	812.1875	298	858.4375	813.4375
199	855.9625	810.9625	249	857.2125	812.2125	299	858.4625	813.4625
200	855.9875	810.9875	250	857.2375	812.2375	300	858.4875	813.4875

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
301	858.5125	813.5125	351	859.7625	814.7625	401	861.0125	816.0125
302	858.5375	813.5375	352	859.7875	814.7875	402	861.0375	816.0375
303	858.5625	813.5625	353	859.8125	814.8125	403	861.0625	816.0625
304	858.5875	813.5875	354	859.8375	814.8375	404	861.0875	816.0875
305	858.6125	813.6125	355	859.8625	814.8625	405	861.1125	816.1125
306	858.6375	813.6375	356	859.8875	814.8875	406	861.1375	816.1375
307	858.6625	813.6625	357	859.9125	814.9125	407	861.1625	816.1625
308	858.6875	813.6875	358	859.9375	814.9375	408	861.1875	816.1875
309	858.7125	813.7125	359	859.9625	814.9625	409	861.2125	816.2125
310	858.7375	813.7375	360	859.9875	814.9875	410	861.2375	816.2375
311	858.7625	813.7625	361	860.0125	815.0125	411	861.2625	816.2625
312	858.7875	813.7875	362	860.0375	815.0375	412	861.2875	816.2875
313	858.8125	813.8125	363	860.0625	815.0625	413	861.3125	816.3125
314	858.8375	813.8375	364	860.0875	815.0875	414	861.3375	816.3375
315	858.8625	813.8625	365	860.1125	815.1125	415	861.3625	816.3625
316	858.8875	813.8875	366	860.1375	815.1375	416	861.3875	816.3875
317	858.9125	813.9125	367	860.1625	815.1625	417	861.4125	816.4125
318	858.9375	813.9375	368	860.1875	815.1875	418	861.4375	816.4375
319	858.9625	813.9625	369	860.2125	815.2125	419	861.4625	816.4625
320	858.9875	813.9875	370	860.2375	815.2375	420	861.4875	816.4875
321	859.0125	814.0125	371	860.2625	815.2625	421	861.5125	816.5125
322	859.0375	814.0375	372	860.2875	815.2875	422	861.5375	816.5375
323	859.0625	814.0625	373	860.3125	815.3125	423	861.5625	816.5625
324	859.0875	814.0875	374	860.3375	815.3375	424	861.5875	816.5875
325	859.1125	814.1125	375	860.3625	815.3625	425	861.6125	816.6125
326	859.1375	814.1375	376	860.3875	815.3875	426	861.6375	816.6375
327	859.1625	814.1625	377	860.4125	815.4125	427	861.6625	816.6625
328	859.1875	814.1875	378	860.4375	815.4375	428	861.6875	816.6875
329	859.2125	814.2125	379	860.4625	815.4625	429	861.7125	816.7125
330	859.2375	814.2375	380	860.4875	815.4875	430	861.7375	816.7375
331	859.2625	814.2625	381	860.5125	815.5125	431	861.7625	816.7625
332	859.2875	814.2875	382	860.5375	815.5375	432	861.7875	816.7875
333	859.3125	814.3125	383	860.5625	815.5625	433	861.8125	816.8125
334	859.3375	814.3375	384	860.5875	815.5875	434	861.8375	816.8375
335	859.3625	814.3625	385	860.6125	815.6125	435	861.8625	816.8625
336	859.3875	814.3875	386	860.6375	815.6375	436	861.8875	816.8875
337	859.4125	814.4125	387	860.6625	815.6625	437	861.9125	816.9125
338	859.4375	814.4375	388	860.6875	815.6875	438	861.9375	816.9375
339	859.4625	814.4625	389	860.7125	815.7125	439	861.9625	816.9625
340	859.4875	814.4875	390	860.7375	815.7375	440	861.9875	816.9875
341	859.5125	814.5125	391	860.7625	815.7625	441	862.0125	817.0125
342	859.5375	814.5375	392	860.7875	815.7875	442	862.0375	817.0375
343	859.5625	814.5625	393	860.8125	815.8125	443	862.0625	817.0625
344	859.5875	814.5875	394	860.8375	815.8375	444	862.0875	817.0875
345	859.6125	814.6125	395	860.8625	815.8625	445	862.1125	817.1125
346	859.6375	814.6375	396	860.8875	815.8875	446	862.1375	817.1375
347	859.6625	814.6625	397	860.9125	815.9125	447	862.1625	817.1625
348	859.6875	814.6875	398	860.9375	815.9375	448	862.1875	817.1875
349	859.7125	814.7125	399	860.9625	815.9625	449	862.2125	817.2125
350	859.7375	814.7375	400	860.9875	815.9875	450	862.2375	817.2375

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
451	862.2625	817.2625	501	863.5125	818.5125	551	864.7625	819.7625
452	862.2875	817.2875	502	863.5375	818.5375	552	864.7875	819.7875
453	862.3125	817.3125	503	863.5625	818.5625	553	864.8125	819.8125
454	862.3375	817.3375	504	863.5875	818.5875	554	864.8375	819.8375
455	862.3625	817.3625	505	863.6125	818.6125	555	864.8625	819.8625
456	862.3875	817.3875	506	863.6375	818.6375	556	864.8875	819.8875
457	862.4125	817.4125	507	863.6625	818.6625	557	864.9125	819.9125
458	862.4375	817.4375	508	863.6875	818.6875	558	864.9375	819.9375
459	862.4625	817.4625	509	863.7125	818.7125	559	864.9625	819.9625
460	862.4875	817.4875	510	863.7375	818.7375	560	864.9875	819.9875
461	862.5125	817.5125	511	863.7625	818.7625	561	865.0125	820.0125
462	862.5375	817.5375	512	863.7875	818.7875	562	865.0375	820.0375
463	862.5625	817.5625	513	863.8125	818.8125	563	865.0625	820.0625
464	862.5875	817.5875	514	863.8375	818.8375	564	865.0875	820.0875
465	862.6125	817.6125	515	863.8625	818.8625	565	865.1125	820.1125
466	862.6375	817.6375	516	863.8875	818.8875	566	865.1375	820.1375
467	862.6625	817.6625	517	863.9125	818.9125	567	865.1625	820.1625
468	862.6875	817.6875	518	863.9375	818.9375	568	865.1875	820.1875
469	862.7125	817.7125	519	863.9625	818.9625	569	865.2125	820.2125
470	862.7375	817.7375	520	863.9875	818.9875	570	865.2375	820.2375
471	862.7625	817.7625	521	864.0125	819.0125	571	865.2625	820.2625
472	862.7875	817.7875	522	864.0375	819.0375	572	865.2875	820.2875
473	862.8125	817.8125	523	864.0625	819.0625	573	865.3125	820.3125
474	862.8375	817.8375	524	864.0875	819.0875	574	865.3375	820.3375
475	862.8625	817.8625	525	864.1125	819.1125	575	865.3625	820.3625
476	862.8875	817.8875	526	864.1375	819.1375	576	865.3875	820.3875
477	862.9125	817.9125	527	864.1625	819.1625	577	865.4125	820.4125
478	862.9375	817.9375	528	864.1875	819.1875	578	865.4375	820.4375
479	862.9625	817.9625	529	864.2125	819.2125	579	865.4625	820.4625
480	862.9875	817.9875	530	864.2375	819.2375	580	865.4875	820.4875
481	863.0125	818.0125	531	864.2625	819.2625	581	865.5125	820.5125
482	863.0375	818.0375	532	864.2875	819.2875	582	865.5375	820.5375
483	863.0625	818.0625	533	864.3125	819.3125	583	865.5625	820.5625
484	863.0875	818.0875	534	864.3375	819.3375	584	865.5875	820.5875
485	863.1125	818.1125	535	864.3625	819.3625	585	865.6125	820.6125
486	863.1375	818.1375	536	864.3875	819.3875	586	865.6375	820.6375
487	863.1625	818.1625	537	864.4125	819.4125	587	865.6625	820.6625
488	863.1875	818.1875	538	864.4375	819.4375	588	865.6875	820.6875
489	863.2125	818.2125	539	864.4625	819.4625	589	865.7125	820.7125
490	863.2375	818.2375	540	864.4875	819.4875	590	865.7375	820.7375
491	863.2625	818.2625	541	864.5125	819.5125	591	865.7625	820.7625
492	863.2875	818.2875	542	864.5375	819.5375	592	865.7875	820.7875
493	863.3125	818.3125	543	864.5625	819.5625	593	865.8125	820.8125
494	863.3375	818.3375	544	864.5875	819.5875	594	865.8375	820.8375
495	863.3625	818.3625	545	864.6125	819.6125	595	865.8625	820.8625
496	863.3875	818.3875	546	864.6375	819.6375	596	865.8875	820.8875
497	863.4125	818.4125	547	864.6625	819.6625	597	865.9125	820.9125
498	863.4375	818.4375	548	864.6875	819.6875	598	865.9375	820.9375
499	863.4625	818.4625	549	864.7125	819.7125	599	865.9625	820.9625
500	863.4875	818.4875	550	864.7375	819.7375	600	865.9875	820.9875

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
-	866.0000	821.0000	645	866.6000	821.6000	691	867.2000	822.2000
601	866.0125	821.0125	646	866.6125	821.6125	692	867.2125	822.2125
-	866.0250	821.0250	647	866.6250	821.6250	693	867.2250	822.2250
602	866.0375	821.0375	648	866.6375	821.6375	694	867.2375	822.2375
603	866.0500	821.0500	649	866.6500	821.6500	695	867.2500	822.2500
604	866.0625	821.0625	650	866.6625	821.6625	696	867.2625	822.2625
605	866.0750	821.0750	651	866.6750	821.6750	697	867.2750	822.2750
606	866.0875	821.0875	652	866.6875	821.6875	698	867.2875	822.2875
607	866.1000	821.1000	653	866.7000	821.7000	699	867.3000	822.3000
608	866.1125	821.1125	654	866.7125	821.7125	700	867.3125	822.3125
609	866.1250	821.1250	655	866.7250	821.7250	701	867.3250	822.3250
610	866.1375	821.1375	656	866.7375	821.7375	702	867.3375	822.3375
611	866.1500	821.1500	657	866.7500	821.7500	703	867.3500	822.3500
612	866.1625	821.1625	658	866.7625	821.7625	704	867.3625	822.3625
613	866.1750	821.1750	659	866.7750	821.7750	705	867.3750	822.3750
614	866.1875	821.1875	660	866.7875	821.7875	706	867.3875	822.3875
615	866.2000	821.2000	661	866.8000	821.8000	707	867.4000	822.4000
616	866.2125	821.2125	662	866.8125	821.8125	708	867.4125	822.4125
617	866.2250	821.2250	663	866.8250	821.8250	709	867.4250	822.4250
618	866.2375	821.2375	664	866.8375	821.8375	710	867.4375	822.4375
619	866.2500	821.2500	665	866.8500	821.8500	711	867.4500	822.4500
620	866.2625	821.2625	666	866.8625	821.8625	712	867.4625	822.4625
621	866.2750	821.2750	667	866.8750	821.8750	713	867.4750	822.4750
622	866.2875	821.2875	668	866.8875	821.8875	714	867.4875	822.4875
623	866.3000	821.3000	669	866.9000	821.9000	-	867.5000	822.5000
624	866.3125	821.3125	670	866.9125	821.9125	715	867.5125	822.5125
625	866.3250	821.3250	671	866.9250	821.9250	-	867.5250	822.5250
626	866.3375	821.3375	672	866.9375	821.9375	716	867.5375	822.5375
627	866.3500	821.3500	673	866.9500	821.9500	717	867.5500	822.5500
628	866.3625	821.3625	674	866.9625	821.9625	718	867.5625	822.5625
629	866.3750	821.3750	675	866.9750	821.9750	719	867.5750	822.5750
630	866.3875	821.3875	676	866.9875	821.9875	720	867.5875	822.5875
631	866.4000	821.4000	-	867.0000	822.0000	721	867.6000	822.6000
632	866.4125	821.4125	677	867.0125	822.0125	722	867.6125	822.6125
633	866.4250	821.4250	-	867.0250	822.0250	723	867.6250	822.6250
634	866.4375	821.4375	678	867.0375	822.0375	724	867.6375	822.6375
635	866.4500	821.4500	679	867.0500	822.0500	725	867.6500	822.6500
636	866.4625	821.4625	680	867.0625	822.0625	726	867.6625	822.6625
637	866.4750	821.4750	681	867.0750	822.0750	727	867.6750	822.6750
638	866.4875	821.4875	682	867.0875	822.0875	728	867.6875	822.6875
-	866.5000	821.5000	683	867.1000	822.1000	729	867.7000	822.7000
639	866.5125	821.5125	684	867.1125	822.1125	730	867.7125	822.7125
-	866.5250	821.5250	685	867.1250	822.1250	731	867.7250	822.7250
640	866.5375	821.5375	686	867.1375	822.1375	732	867.7375	822.7375
641	866.5500	821.5500	687	867.1500	822.1500	733	867.7500	822.7500
642	866.5625	821.5625	688	867.1625	822.1625	734	867.7625	822.7625
643	866.5750	821.5750	689	867.1750	822.1750	735	867.7750	822.7750
644	866.5875	821.5875	690	867.1875	822.1875	736	867.7875	822.7875

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
737	867.8000	822.8000	783	868.4000	823.4000	-	869.0000	824.0000
738	867.8125	822.8125	784	868.4125	823.4125	-	869.0125	824.0125
739	867.8250	822.8250	785	868.4250	823.4250	-	869.0250	824.0250
740	867.8375	822.8375	786	868.4375	823.4375	-	869.0375	824.0375
741	867.8500	822.8500	787	868.4500	823.4500	-	869.0500	824.0500
742	867.8625	822.8625	788	868.4625	823.4625	-	869.0625	824.0625
743	867.8750	822.8750	789	868.4750	823.4750	-	869.0750	824.0750
744	867.8875	822.8875	790	868.4875	823.4875	-	869.0875	824.0875
745	867.9000	822.9000	791	868.5000	823.5000	-	869.1000	824.1000
746	867.9125	822.9125	792	868.5125	823.5125	-	869.1125	824.1125
747	867.9250	822.9250	793	868.5250	823.5250	-	869.1250	824.1250
748	867.9375	822.9375	794	868.5375	823.5375	-	869.1375	824.1375
749	867.9500	822.9500	795	868.5500	823.5500	-	869.1500	824.1500
750	867.9625	822.9625	796	868.5625	823.5625	-	869.1625	824.1625
751	867.9750	822.9750	797	868.5750	823.5750	-	869.1750	824.1750
752	867.9875	822.9875	798	868.5875	823.5875	-	869.1875	824.1875
-	868.0000	823.0000	799	868.6000	823.6000	-	869.2000	824.2000
753	868.0125	823.0125	800	868.6125	823.6125	-	869.2125	824.2125
-	868.0250	823.0250	801	868.6250	823.6250	-	869.2250	824.2250
754	868.0375	823.0375	802	868.6375	823.6375	-	869.2375	824.2375
755	868.0500	823.0500	803	868.6500	823.6500	-	869.2500	824.2500
756	868.0625	823.0625	804	868.6625	823.6625	-	869.2625	824.2625
757	868.0750	823.0750	805	868.6750	823.6750	-	869.2750	824.2750
758	868.0875	823.0875	806	868.6875	823.6875	-	869.2875	824.2875
759	868.1000	823.1000	807	868.7000	823.7000	-	869.3000	824.3000
760	868.1125	823.1125	808	868.7125	823.7125	-	869.3125	824.3125
761	868.1250	823.1250	809	868.7250	823.7250	-	869.3250	824.3250
762	868.1375	823.1375	810	868.7375	823.7375	-	869.3375	824.3375
763	868.1500	823.1500	811	868.7500	823.7500	-	869.3500	824.3500
764	868.1625	823.1625	812	868.7625	823.7625	-	869.3625	824.3625
765	868.1750	823.1750	813	868.7750	823.7750	-	869.3750	824.3750
766	868.1875	823.1875	814	868.7875	823.7875	-	869.3875	824.3875
767	868.2000	823.2000	815	868.8000	823.8000	-	869.4000	824.4000
768	868.2125	823.2125	816	868.8125	823.8125	-	869.4125	824.4125
769	868.2250	823.2250	817	868.8250	823.8250	-	869.4250	824.4250
770	868.2375	823.2375	818	868.8375	823.8375	-	869.4375	824.4375
771	868.2500	823.2500	819	868.8500	823.8500	-	869.4500	824.4500
772	868.2625	823.2625	820	868.8625	823.8625	-	869.4625	824.4625
773	868.2750	823.2750	821	868.8750	823.8750	-	869.4750	824.4750
774	868.2875	823.2875	822	868.8875	823.8875	-	869.4875	824.4875
775	868.3000	823.3000	823	868.9000	823.9000	-	869.5000	824.5000
776	868.3125	823.3125	824	868.9125	823.9125	-	869.5125	824.5125
777	868.3250	823.3250	825	868.9250	823.9250	-	869.5250	824.5250
778	868.3375	823.3375	826	868.9375	823.9375	-	869.5375	824.5375
779	868.3500	823.3500	827	868.9500	823.9500	-	869.5500	824.5500
780	868.3625	823.3625	828	868.9625	823.9625	-	869.5625	824.5625
781	868.3750	823.3750	829	868.9750	823.9750	-	869.5750	824.5750
782	868.3875	823.3875	830	868.9875	823.9875	-	869.5875	824.5875

800 MHz Channels

FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq.	Mobile Tx Freq	FCC Chan. No.	Mobile Rx Freq	Mobile Tx Freq
-	869.6000	824.6000	-	869.7375	824.7375	-	869.8750	824.8750
-	869.6125	824.6125	-	869.7500	824.7500	-	869.8875	824.8875
-	869.6250	824.6250	-	869.7625	824.7625	-	869.9000	824.9000
-	869.6375	824.6375	-	869.7750	824.7750	-	869.9125	824.9125
-	869.6500	824.6500	-	869.7875	824.7875	-	869.9250	824.9250
-	869.6625	824.6625	-	869.8000	824.8000	-	869.9375	824.9375
-	869.6750	824.6750	-	869.8125	824.8125	-	869.9500	824.9500
-	869.6875	824.6875	-	869.8250	824.8250	-	869.9625	824.9625
-	869.7000	824.7000	-	869.8375	824.8375	-	869.9750	824.9750
-	869.7125	824.7125	-	869.8500	824.8500	-	869.9875	824.9875
-	869.7250	824.7250	-	869.8625	824.8625			

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